MOTORSHIP CONSTRUCTION IN GERMANY

NEW YORK SEATTLE

MOTORSHIP

Devoted to Commercial and Naval Motor Vessels

"MOTORSHIP" is entered as second-class matter at the Post-office at New York, N. Y., U. S. A., July, 1918, under the Act of March 3rd, 1879. Office of Publication, 282 W. 25th St., New York, N. Y.

Issued Monthly
PRICE 25 CENTS
Domestic, $2.00 per year
Foreign, $3.00 per year

SEPTEMBER, 1921
Vol. 6 No. 9

EXCLUSIVE technical and non-technical articles on design, construction and operation of oil-engines and motorships by the world's foremost writers on marine engineering.

MOTORSHIP

(Trade Mark Registered)

PROFUSELY illustrated with photographic reproductions of the newest designs in international merchant motorship and Diesel-engine construction.

Vol. VI New York, U. S. A., September, 1921 No. 9

Cable Address—Freemote, New York

Electrical-Drive for Diesel Motorship Propulsion

TO quite a few of us the question of electrical transmission of propelling-power aboard ship always has been absorbingly interesting; and, although there have been many experiments and many trials with Diesel-electric vessels of moderately large size and power the problem as yet has not satisfactorily been answered.

While it must be admitted that electrical power offers many very attractive features, the naval-architect must not let the attraction of the advantages outweigh other problems that arise, without first thoroughly probing their relative values, both from an engineering standpoint and from an owner's aspect. The steam-engine merely is a transmitter of power and it is not a power producer, and be the fuel supply ever so plentiful it cannot generate power, but only can transmit power produced by heat from water in a boiler to the propeller-shaft. The internal-combustion engine is a power producer and directly transmits its own power to the propeller-shaft, hence the use of any intermediate means of power-transmission is equivalent to turning the Diesel engine into a boiler, with loss of power in transmission. But, both use the same fuels. These differences in principle have to be taken into consideration when figuring upon electrical drive for ocean-going ships.

Therefore, if economy be the principal objective of the electrical drive, its general use hardly can be the most desirable of systems for the propulsion of oil-engined motorships for reasons that presently will be explained. While many well-built and well-designed motor-vessels have demonstrated themselves to have flexible enough maneuvering qualities for all ordinary marine purposes, and to have a reliability even better than the average steamer, it must be admitted that there undoubtedly have been some which unfortunately have not come up to the standard of the best. This, of course, has been due more to the lack of experience of individual builders rather than direct fault of the type of propelling power.

In other words, if all Diesel-driven vessels were developed to the degree attained by the best, there absolutely would be no need for any system of power transmission between the propeller-shaft and the engine, at least so far as flexibility and reliability are concerned. But, if it be possible to attain further economy, then every effort should be made to develop and utilize electrical transmission-drive. Failing reasonable promise of economy, is it not logical that the using of electrical, pneumatic, and hydraulic power-transmitters, or any form of reduction-gears, is not the truly ideal line of development to follow except for special ships in special services.

Perhaps all of us do not grasp with its deserved intensity the fact that the steam-engine merely is a transmitter of power, and that it neither is a power, producer nor a power generator. And instead of developing power it actually loses much of the power while transmitting the same. In other words, a steam-engine without its boiler cannot produce power, and it is the boiler that produces the power from the fuel and water, and the steam-engine transmits it to the propeller shaft. Hence if electrical-transmission is used in conjunction with a steam-engine, it merely means an increase in the number of power-transmitter units and does not change the basc functions of the engine or boiler, the power, or energy, reaching the propeller in six stages, with a direct loss in each stage. This alone is sufficient to condemn steam-turbine-electric drive when seeking economy, and it is surprising that electrical companies recommend it for moderate powers, because the system will soon die a natural death. Diesel-electric drive is a much better target, although not the bull's-eye because with some types of ships Diesel-electric drive will be ideal.

An Interesting Theoretical Argument Against This System.

[Of late the interest in Diesel-electric drive has become re-doubled in the United States, and a number of shipowners have practically decided to adopt the same as soon as they build new vessels or convert existing steamships. Numerous requests have come into our office to give both the "fors and against" the system, in order that shipowners may be familiar with both sides. By request we are republishing on this page the principal parts of an article contributed to "Motorship" during 1918, in which a number of interesting arguments were brought out. If there are any flaws in his claims it is to the interest of electrical-engineers to reveal them in a vigorous manner, and our columns are open for the purpose. Additional articles giving the reasons why Diesel-electric drive should be adopted will be given in subsequent issues. Our opinion is that one of the best applications of the Diesel-electric drive is for converting existing steamships. Unfortunately, the author of the article on this page does not touch upon this particular field. Both sides of every technical question always should be given, and the various "fors and againsts" thoroughly debated, such correspondence then becoming a valuable and permanent record of the experiences and beliefs of those who are vitally concerned.—Editor.]

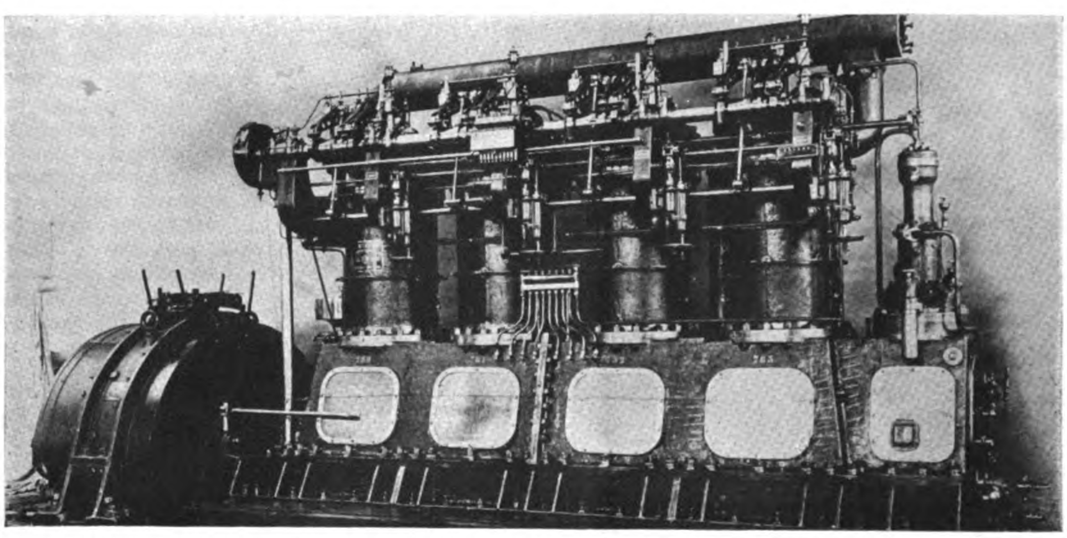
How different is the case of the self-contained internal-combustion oil-engine. This form of mechanism is a power producer in itself, and it directly produces and transmits its own power to the propeller. That is why it only uses one-third the quantity of oil-fuel. Utilizing an electrical or other form of power transmitter in conjunction with a Diesel-type engine is equivalent to turning the latter into a boiler, because it then merely acts as a generator of power from the fuel, and does not transmit the power direct to the propeller. Seeing that one of the most beautiful features of the oil-engine is its dispensation of the boiler, it easily can be understood why it cannot be logical to utilize a separate power-transmitter thereof, and, which under ordinary maritime conditions such cannot be so economical as the direct drive. Incidentally all this should help marine men to understand what a wonderful engine the late Dr. Rudolf Diesel gave to shipowners and why they all should use every effort to encourage its perfection and world-wide adoption, instead of "picking holes" in it on every slightest opportunity.

Let us all remember that an economical engine is an efficient engine, so an efficient engine is an economical power. And, as the greatest advantage of the Diesel engine is its remarkable economy, any lines of development that will impair this wonderful economy should not be regarded as the ultimate aim. This being so, shipowners should strive to make *all* designs of Diesel engines properly reliable, whereby they can be efficiently utilized when coupled direct to the propeller shaft. And let them co-operate and assist the oil-engine builder with that progressive and broad-minded end in view.

If the direct application of power at present be not everything to be desired, let us rapidly perfect it rather than resort to some intermediate means.

All this, of course, is more or less theorizing, so let us come down from the sky to the more practical side of the argument. But, let it first clearly be understood that these various remarks have no bearing whatever upon the use of electrical transmission of power for ships' auxiliary machinery, the requirements of which entirely differ, direct-Diesel drive not being practical. Electrical drive for the latter purpose is highly desirable.

In the earliest days of the Russian motorship fleets, before ocean-going motor-vessels were in service, there were no directly-reversible Diesel-engines, consequently the Russian engineers were forced to turn to some system of transmission. For at least 14 tankers and warships of 500 to 1,200 b.h.p. the electric-drive was used. There were no means of coupling the three oil-engines to the triple-screws, the electrical losses being sustained during the entire period of working. But with later craft electrical losses were present only during the astern motion and a slow-ahead speed.



One of the two 600 b.h.p. Nobel-Diesel and Del Proposto electric-drive generator-sets of the Russian cruiser "Ruenda," completed in 1913

Economical Transportation on the New York State Canal

A Series of Exhaustive Articles on Barge Commerce Along the World's Greatest Inland Waterway

PART V

HULLS, MOTIVE POWER, AND EQUIPMENT OF CANAL CRAFT

As motive power for the propulsion of modern canal craft the internal-combustion engine using heavy oil for fuel stands pre-eminently fitted. To those who have followed the progress and achievements made on the high seas with machinery of this type and recorded in the pages of "Motorship," emphasis of this point would be merely superfluous; but to others, who have not become fully acquainted with things accomplished in this field, we desire to submit, in the first place, the fact that for canal work only engines of medium and small powers come into consideration. The construction, maintenance, and operation of low-powered units is very substantially less than proportionate to the small size, and it is a well-known fact that things can be done with a small machine which would wreck a large one at the first revolution. Problems inherent in greatness of size such as are successfully met as a matter of every-day routine in ocean vessels do not even arise in the power plants of boats used on the Canal.

A further consideration of no small weight is the fact that in Canal operation long non-stop runs at full power do not occur. The difference between the essentially intermittent service required on the Canal and the long, hard grind, say, of a transatlantic voyage is so obvious that it need merely be mentioned; we would add, however, that if large engines successfully withstand the severities of ocean usage, small ones on inland waterways can more than meet every conceivable demand that may be made upon them. The proper working of heavy-oil engines on Canal vessels may be taken for granted, just as the shell-plating or the rivets may be taken for granted.

At the risk, also of overemphasizing the obvious, we submit that the fuel economy of internal-combustion oil-engines favors them in the ratio of three to one as compared to the only practicable alternative, steam power. If the stand-by losses of the latter are considered, the comparison is better than four to one in favor of the oil-engine. As we have previously pointed out, the stand-by losses incurred by the use of steam on a waterway averaging less than 8 miles of straight sailing between locks would be ruinous in competition with oil-engined-craft having no stand-by loss whatever.

Savings due to reduction of crews made possible by the use of oil-engines are a large item. Owing to a number of varying conditions such as length of run, hours operated per day, 24-hour operation, and the like, it is impossible to give a general example. If it is borne in mind, however, that a steam plant requires skilled feeding of fuel and water, neither of which functions even require an attendant in the case of oil-engines, the resulting economies are apparent.

Recruiting properly skilled oil-engine room staffs will be considerably easier along the route of the Canal than at seaports. In this case again, the fact that it is regularly possible to induce suitable men to face the hardships and solitude of deep-sea voyages is a very substantial guarantee that the right kind of oil-engined canal-boat operators will be available to the full extent of the demand. In the Canal service no long runs need be made which take the operator into foreign countries far away from his home; and the constant contact with land and sources of supply make the Canal engineer's job resemble that of the stationary plant operator a good deal more than that of the deep-sea engineer.

Certainly it would be difficult to imagine a section of the country better suited as a source of mechanically skilled personnel than the region traversed by the Canal. Buffalo, Rochester, Syracuse, Schenectady, and many other Canal cities rank among the foremost in the country as centers of mechanical industries.

In such a district, also, mechanical service and supply stations can be readily made available. Labor and plant facilities may almost be said to be waiting for utilization in connection with canal-borne power plants. In addition to this, "extraordinary repairs," involving the shipment of engine parts to and from the factories of origin would be far less burdensome in the Canal service. Since this waterway is paralleled by seven or eight railroad lines, and as it is very centrally located to begin with, practically every oil-engine manufacturer who will have furnished engines for Canal use will be in a position to make repairs and replacements at the shortest possible notice. Here again the facilities that are available are vastly superior to those on the basis of which enviable motor-shipping progress has been made on the high seas.

It is earnestly to be hoped that this splendid promise will not be made vain in Canal enterprises by indiscriminate and hasty applications of oil-engines under conditions insufficiently thought out and planned for. Like all things that are worth while, success in these undertakings will come as the result of a comprehensive grasp of all the technical considerations involved and of an objective study of the factors that enter into the design and construction of craft fitted to the environment in which they will be placed.

The lessons taught by the old canal, to which we called attention in a previous article, hammer home the point that you can't take any old design of a scow or barge, put an internal-combustion power plant in it, and expect to get a servicable canal vessel. It won't even do to take an old time barge and try to tow it at the speeds which the economics of the new Canal will demand.

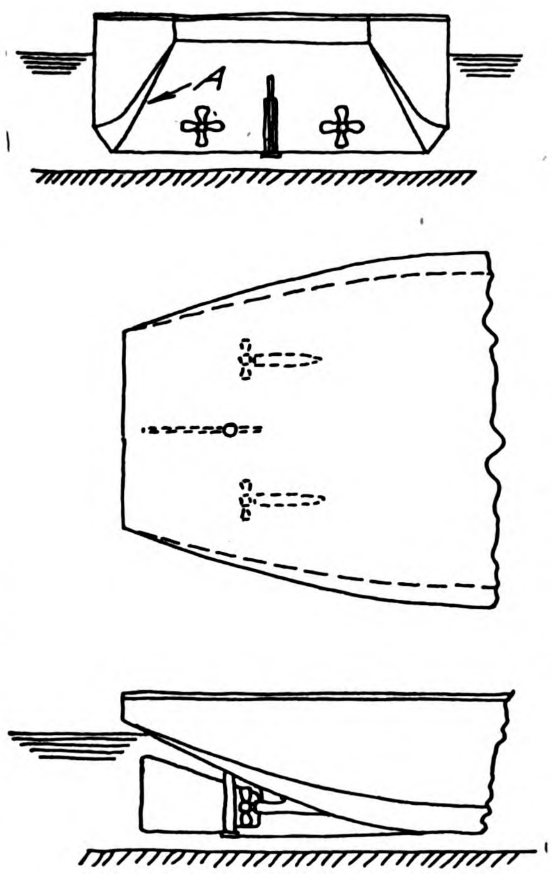
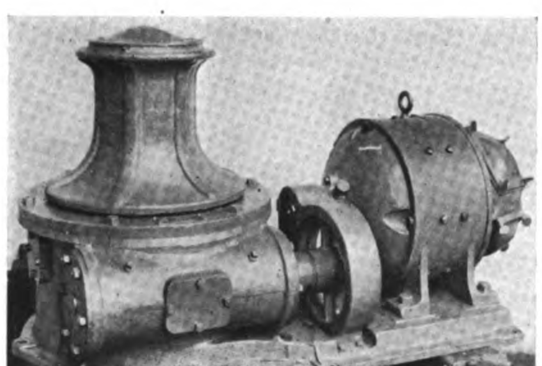


Fig. 1.



Electric capstan built by the American Engineering Co. for canal barges

The critical part of a hull intended for use on the Canal is the stern. Like in the designs of other vessels, the problem of merging streams of water flowing past the hull on both sides of and under it must be met by a compromise form which allows the parted streamlines to re-unite with a minimum of abruptness consistent with the avoidance of too attenuated a form. For vessels of a very moderate speed such as those which are to be considered for use on the Canal, these limits can be observed while using flat or rolled plates only; no furnace plates are required. This convenience lends itself to abuse, however, as will be evident from an attempt to drive by power a stern shaped like that shown in Fig. 1.

Not much reasoning is required to show that practically all the water which makes up the flow to the propellers and rudder comes from underneath the flat bottom of the boat, since the inadequate bevels A allow the streams on the sides to pass inward towards the center only after having made them turbulent. This condition would be serious even in deep water and is aggravated for canal work because the thickness of water under the boats is bound to be limited. The result of this alone is to make the boast suck and drag in the canal, a process very wasteful of power; but a more serious difficulty arises from the fact that the boat's "sense of direction," which depends almost entirely upon the proper flowing of the two side streams, is here seriously impaired.

Twin screws are indicated in Fig. 1, a provision which might appear at first glance to obviate the poor steering qualities of the design. And it is certainly true that twin screws are a most effective provision for accurate steering, but only on the condition that they are applied with discrimination. One element to be considered in the use of twin screws is the degree of flexibility of the power plant, about which more later, but from our present point of view the condition that the two water streams be separate, well-defined and at all times independent of each other is the governing one. The rudder-fin shown in Fig. 1 is not sufficient for this requirement and in cases where one engine is run at a speed differing from, or opposite to that of the other one in order to make a sharp turn, a condition of ill-defined turbulence, rather than a reliable and responsive steering action is apt to be the result.

An obvious remedy is to move the centerlines of the propellers further apart. To the argument that this makes it increasingly difficult for a single engineer on watch to manoeuver two machines it may be answered that he cannot attend to more than one at a given time anyway and that the few extra steps which he would have to take as the result of this change are a small matter compared to the rest of the manoeuvering process. A further improvement in the conditions of flow may be had by making the stern more pointed and accentuating the bevels A. A complete, but expensive, solution of the problem would be the adoption of the conventional form of stern such as is found on ordinary cargo steamers.

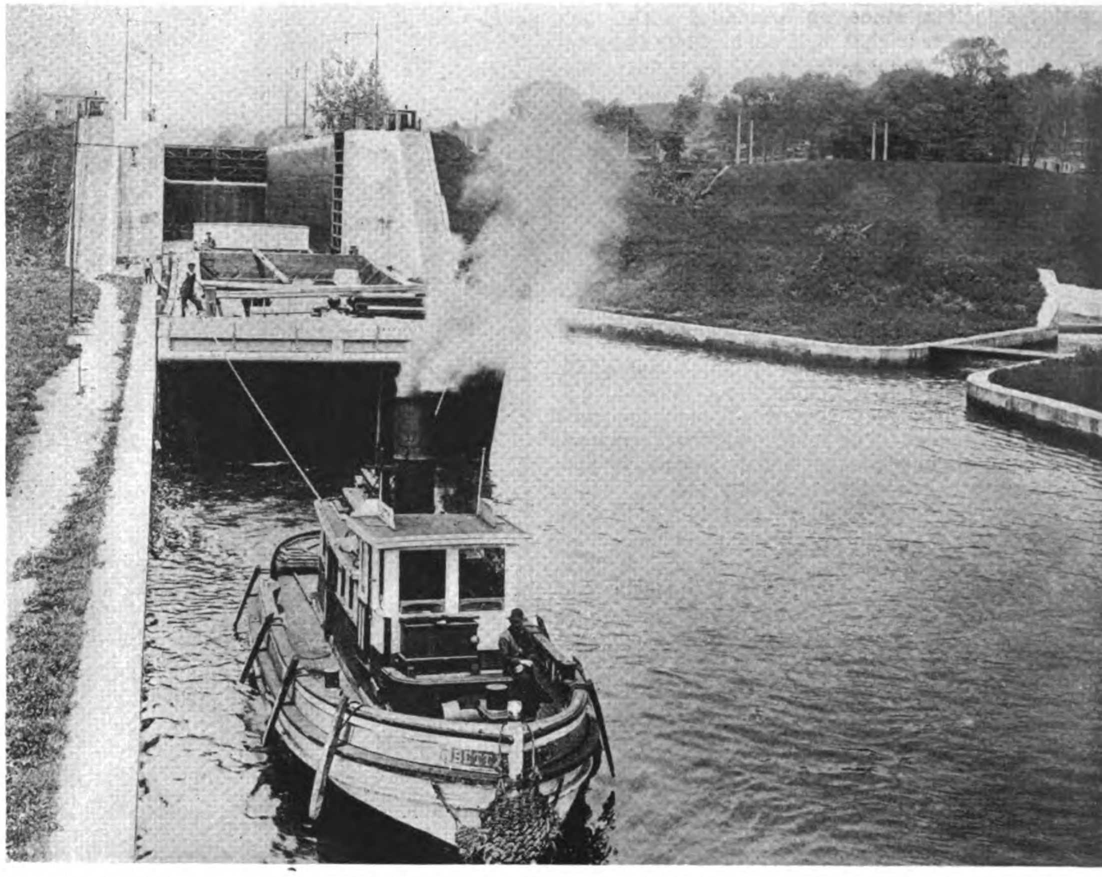
Our illustration throws light on the disposition of internal-combustion power plants also. Owing to the fact that canal craft are not endangered, like ocean vessels, by total loss of power, and that the toal horsepower required can readily be developed in a single unit, the use of twin screws would appear to be recommended entirely as a means for better steering and manoeuvering in the bends and locks of the Canal. There can be no doubt that engines which are offered now more than meet all ordinary demands for flexibility, on the other hand, it is not fully determined whether they afford the extreme delicacy in handling which they would have to have in order to become adjuncts of the steering gear.

Engines which require external heating appliances are at a disadvantage in this respect because an engineer has enough to do answering bells without having to coax eight or twelve separate torches. Incidentally, since canal boats are in use

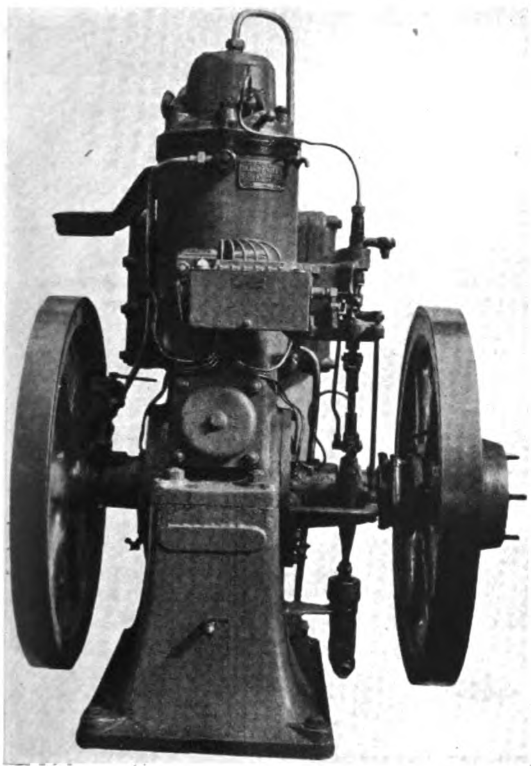
mainly during the hot months of the year, torches are hardly a welcome addition to the sun's heat beating down on the deck overhead. Special and thoroughly adequate ventilating means should in all cases be provided. A further characteristic of externally heated machines is a certain indefiniteness in starting from rest, which is generally overcome by energetic hand-operation of the fuel pumps and the consequent production of heavy pre-ignitions in the cylinders. This item alone in the list of the watch engineer's duties is enough to make it incorrect to count on surface ignition engines as adjuncts in twin-screw manoeuvring.

The real field for the surface-ignition machine is the single-screw boat in which proper steering qualities are insured by the right form of stern and the provision of suitable steering gear.

For twin-screw installations, solid-injection, near-Diesel, and Diesel engines are suitable, provided, again, that the fact of simple observation on the Canal are taken into account. Boats of a size sufficient to warrant the use of two engines are apt, as we have seen, to have an engine-room layout in which that very facility of manoeuvering which two machines are intended to provide is somewhat interfered with. In the case of the high-compression machine, however, there is nothing to prevent extending the engine controls to a common operating stand.



Another lock of the famous Waterford flight. Note the contrast between the modern lock construction and the wasteful, "antiquated" steam-tug



The 16 b.h.p. Skandia auxiliary oil-engine

A further provision which suggests itself is the installation of an auxiliary air-compressor of a capacity sufficient to keep the main engines turning over indefinitely at a speed high enough to insure prompt ignition when it is required.

Low rotative speeds of the engines are better than high ones. Not only are considerably better propeller efficiencies secured at the relatively low boat speeds, but manoeuvering is also materially improved. Especially while reversing in a full headway, a high-speed propeller requires an appreciable time to "take hold," whereas an equivalent low-speed propeller of larger diameter and greater pitch will begin to push or pull the boat almost instantly. The fuller the shape of the stern, the greater will be the benefit derived from the use of low propeller speeds.

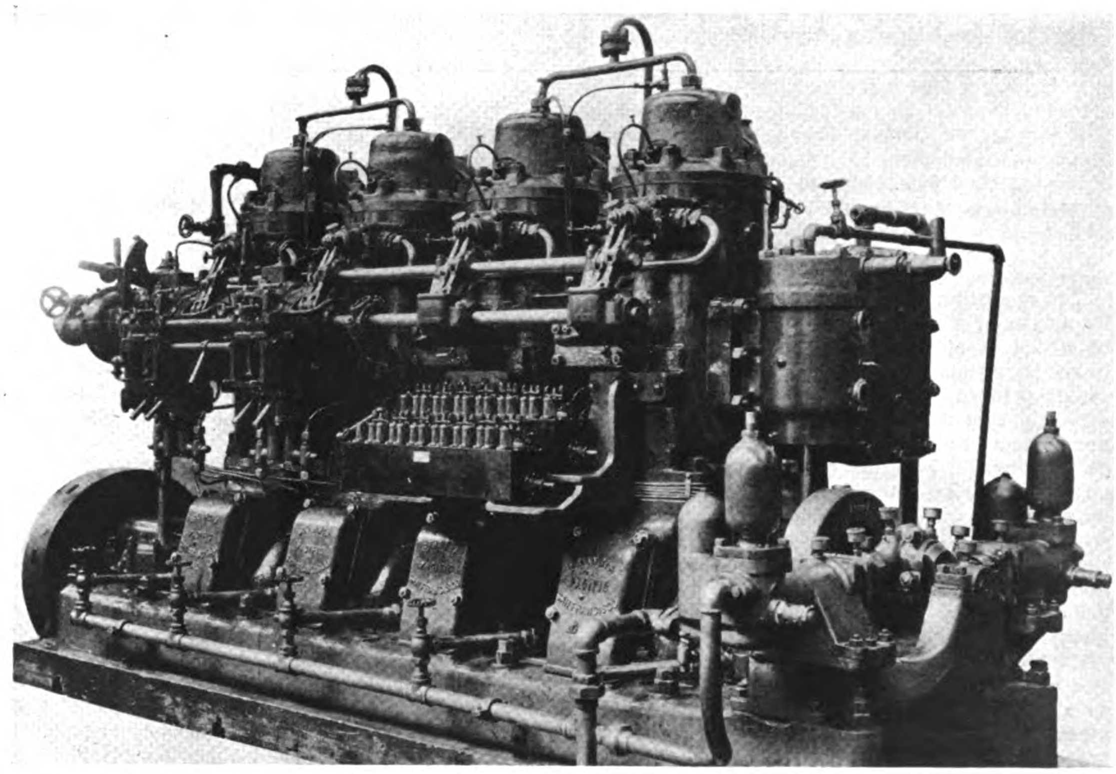
High-speed engines have their place, but not on canal boats. Bore-and-stroke-ratios less than 1.5 should not be admitted and piston speeds maintained at figures that will keep rotative speeds in the neighborhood of 275 r.p.m. The large forces occurring in all working parts of oil-engines make it possible to realize a substantial gain in staunchness and reliability by the simple expedient of reducing the number of force applications and reversals occurring per second. The greater weight of engines designed in recognition of these facts is a matter of zero consequence so far as canal service is concerned and the apparent saving in first cost on high-speed machines is transient and illusory. It has been reported that the Ford Company will use high-speed engines for its new barge fleet. This we should consider a very unwise step.

Diesel-electric drive commends itself emphatically for the service which we have been describing. The main power plant need not be split up into two units; any number of driving motors can be located almost anyhow and anywhere exactly to suit requirements; no auxiliary prime mover need be operated while under way; manoeuvering is done directly by the man who is handling the ship and with a degree of unfailing precision which is hardly attainable by other methods. From a purely technical point of view electric drive in this service is unmatched, or will be until it will have become possible to work out power drives according to the lines already indicated. Whether or not it will be possible to make a hypothetical purchasing agent O. K. a bill for electric drive on a canal boat is something which the future alone will tell.

The first five of a fleet of barges for the Barnes interests are already partly in commission and have been carrying cargoes of grain up and down the canal. They are built of steel, 250 ft. in length, with a beam of 36 ft. and a loaded draught of 10 ft. They are designed for a speed of eight knots.

They are Skandia oil-engine driven and equipped throughout with electrically operated deck and engine room auxiliaries. Current for these is furnished by three 16 b.h.p. single cylinder Skandia oil-engines direct connected to 10-kw General Electric d.c. generators.

The most notable and modern of these auxiliaries are the steering-gears, which are of the electro-hydraulic type. The designers and owners of the barges showed keen wisdom and foresight



One of the 140 b.h.p. Skandia surface-ignition oil-engines installed in the five 2,150 tons displacement barges owned by the Interwaterways Lines, Inc. (Julius Barnes)

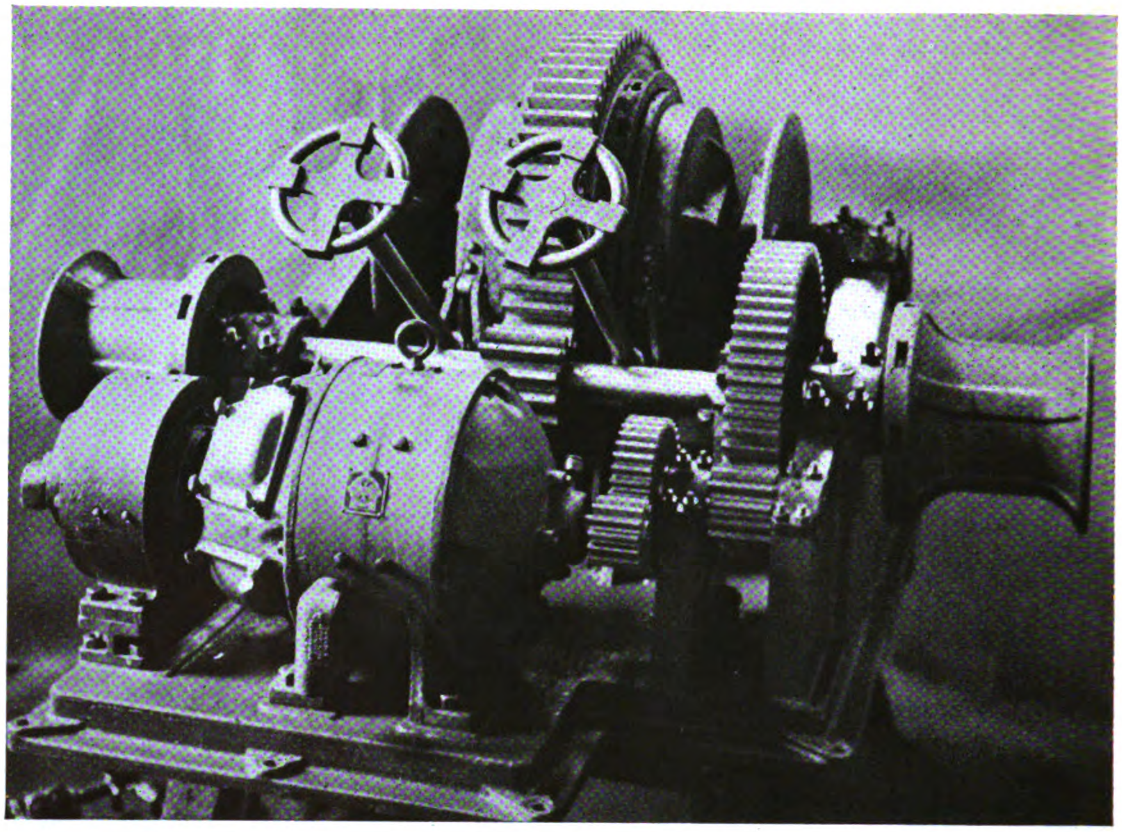
in this selection, since, on a smaller scale, they are the same gear that will steer all the capital ships in our new navy, incuding the scout cruisers, battle cruisers, and battleships.

The steerers are of the Hele-Shaw Martineau design, and were built and furnished by the American Engineering Company of Philadelphia, who own patents in this country.

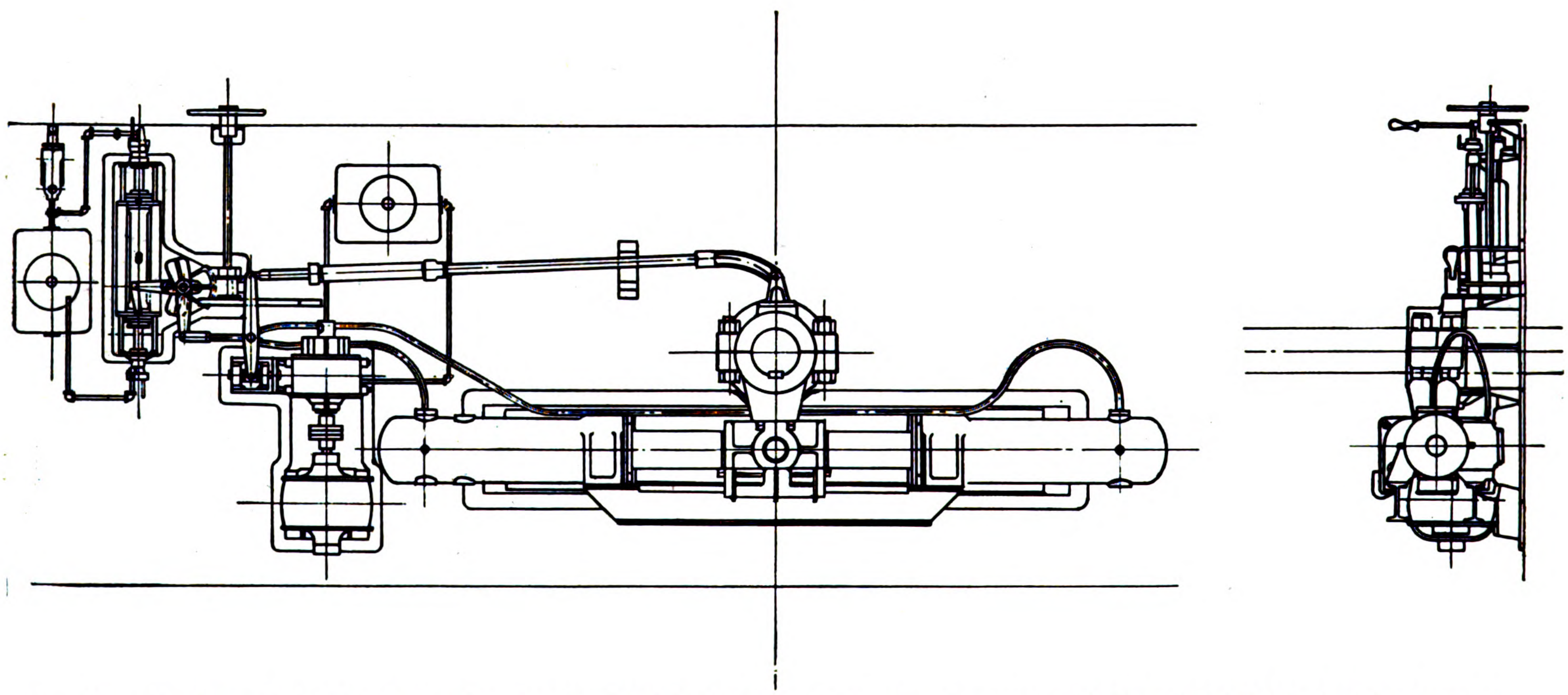
The electro-hydraulic steerer consists of two six-inch plungers of turned and polished steel tubing secured to a two-piece tiller yoke; one motor and pump unit, a complete hydraulic telemotor installation fitted with a trick wheel and follow up control.

The pump unit consists of a No. 3 Hele-shaw Hydraulic pump direct connected to a 3 h.p. motor, 115 volt, direct current, all mounted on a common bedplate. The motor is constantly running when in service. A make-up tank is provided and attached to the pump by piping. Since oil is used as a medium, perfect lubrication of moving parts is insured.

The pump is of the "sliding head" variable stroke type and functions through the action of seven radial pistons, constantly revolving around a common axis. When the guide-ring is concentric with the axis, the stroke is zero, no oil is pumped and the whole system is at rest. Eccentric displacement of the ring produces proportionate movement of the pistons, whose suction and delivery are reversed by giving the guide ring a diametrically opposite displacement. The oil drawn from one of the hydraulic cylinders is sucked into the pump and delivered under pressure to the other cylinder.



American Engineering Co.'s anchor windlass as fitted on the N. Y. canal barges



Hele-Shaw Martineau Hydro-Electric Steering Gear furnished by American Engineering Company to MacDougall-Duluth Ship Building Company for use on sea-going canal boats.

The operation of the control system takes place by means of a hydraulic telemotor, the after unit of which is mounted on a special bedplate and provided with a trick wheel attachment. The telemotor actuates the pump control stem by means of a floating lever, which is differentially connected to a bracket on the rudder tiller. This acts as a follow-up, bringing the pump to the neutral position whenever the steering wheel is at rest.

The claims made for this steerer, which we hope soon to be able to support by personal observation, are that it gives quick response to the helm in restricted waters, that it is economical in the use of power, sensitive, simple, reliable, and positive.

Each of the McDougall barges is equipped with one electric gypsey located on deck and serving as a warping winch. It is of the American Engineering Company combined worm and spur gear type, direct connected to a 5 h.p. d.c. water-tight motor which is mounted on a bedplate extension of the worm gear casing. Its normal duty is 3,000 pounds at a line speed of 26 ft. per minute. The resistance and drum-type controller is located underdeck, with controller handle shaft coming up through the deck at a point convenient for operation. Notable features of this electric gypsey are compactness of design, submerged lubrication of worm, extension of top bearing up into gypsey barrel to reduce bending on shaft, and non-overhauling worm gear to avoid necessity for solenoid brake on motor.

The electric spur-gear anchor-windlass furnished by the American Engineering Company is the same as the conventional steam-driven type, except that it is adapted for electric-motor drive. This design was made as light as possible consistent with requisite factors of safety and compactness was striven for with a view to reducing required deck space to a minimum.

The arrangement consists of a bedplate having an extension for the motor base, with integral bearing housings for main and auxiliary shafts. Three cut teeth spur-gear reductions are used between wildcat shaft and motor, and all gears are protected by suitable gear guards. The wildcat heads are a novel feature, being incorporated in and integral with the main spur gear.

Two warping winch heads are provided on the main pinion auxiliary shaft. A ratchet to prevent overhauling is also provided for this shaft and there are holes for hand-barring in case of motor failure. The warping winch heads may be independently operated by setting the brakes on the wildcats and releasing the locking keys.

The hand brakes are rugged in design and are located in a position convenient for operation.

A 5-h.p. 115-volt, d.c. watertight motor is used with this particular installation and braking is done with a disc-type solenoid brake. The weight of the anchors is 1,500 pounds apiece and they can be hoisted at a speed of six fathoms per minute by means of a 1-inch stud-link chain.

Although the machines are necessarily smaller than the average ship equipment, they are sturdy and well built for the uses to which they are put and particular study has been given to make their operation simple, convenient, and fool-proof.

This equipment, and the excellent hull work of the McDougall-Duluth sea-going canal boats puts them in the foremost ranks of modern American canal ventures. We heartily wish them every technical and commercial success.

JULIUS KUTTNER.
Special Commissioner.

Development of the Nobel Diesel-Engine

The Nobel Engine of To-day, and a Resume of Development Work of the Past with This Design—Progress of the Two-Cycle System at the Nobel Works

By EDWIN LUNDGREN
(Formerly Shop-Superintendent, Ludwig Nobel Maschinefabrik, Petrograd, Russia)

PART II

(*Continued from Page 649, August Issue*)

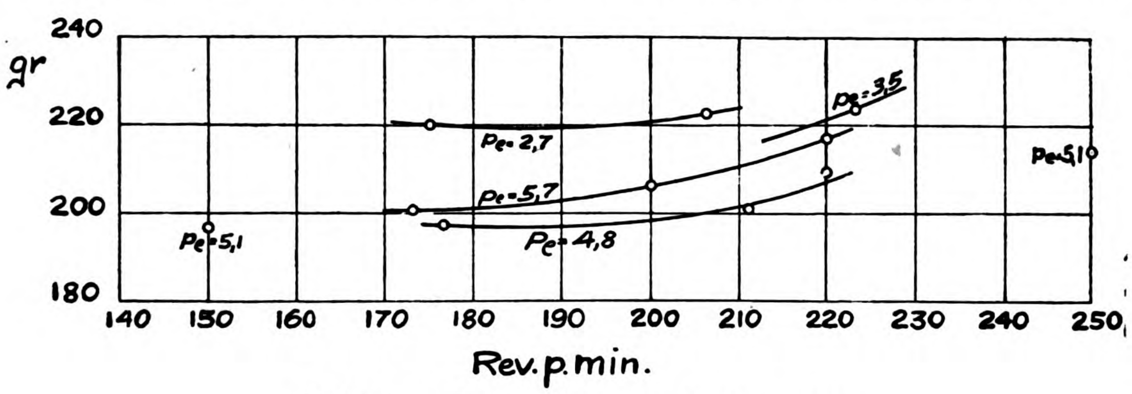
The cylinder-head is made of cast-steel and marked by its exceptionally strong and simple shape. Designers of large internal-combustion engines know by experience, how important this is, as otherwise the cylinder-head casting is liable to crack and thereby cause much trouble and inconvenience. The head of a four-cycle engine is at its best bound to be a complicated casting, crowded as it is by inlet and exhaust valves. The head of this particular engine carries only the fuel- valve, the starting-valve and the safety-valve which was prescribed by the customer and which also serves as a compression-relief valve.

The fuel-valve is also of standard design and provided with the customary small disks in which a number of small holes have been drilled. This traditional design was chosen after a number of other more elaborate, but also more complicated designs had been tried and found to be without particular value.

The valves are actuated by means of levers and cams on the camshaft which is driven by two pairs of spiral gears and an intermediate vertical shaft from the crankshaft. For each fuel-valve three different cams are provided: one for running ahead, another for running astern, and a third for running ahead at very slow speed, during which the engine is working like a four-cycle engine, which is an unusual feature.

It is a matter of common knowledge that the power required for the propulsion of a vessel is decreasing very rapidly with the speed. That means that at low speed of the vessel the engine is running under very light load and an engine of ordinary construction would be working very unfavorably, as it is extremely difficult to attain proper distribution and regular ignition of such small quantities of fuel as then are required. Moreover, the fuel-valve would remain opened entirely too long time, too much compressed-air would be consumed and the compressor would not be able to deliver sufficient air.

To avoid this, several means have been resorted to. In some cases the fulcrum of the valve-lever has been shifted, but this necessarily entails a rather complicated mechanical construction. In other instances the camshaft has been shifted so that another shorter cam has been actuating the fuel-valve, but also with this construction the evil of too small charges remains. A third method is entirely to cut out one or several cylinders. Also this method has its disadvantages, as the different cylinders will obtain different temperatures and it may be difficult to regulate the cooling water properly.



Fuel-consumption per b.h.p. at constant m.e.p.

In the engine described the purpose is achieved by simply letting the engine work like a four-cycle engine or, more correctly expressed, by cutting-out every other explosion. When doing this, evidently each cylinder receives considerably more fuel at the time and is working more efficiently, while at the same time less compressed-air is consumed.

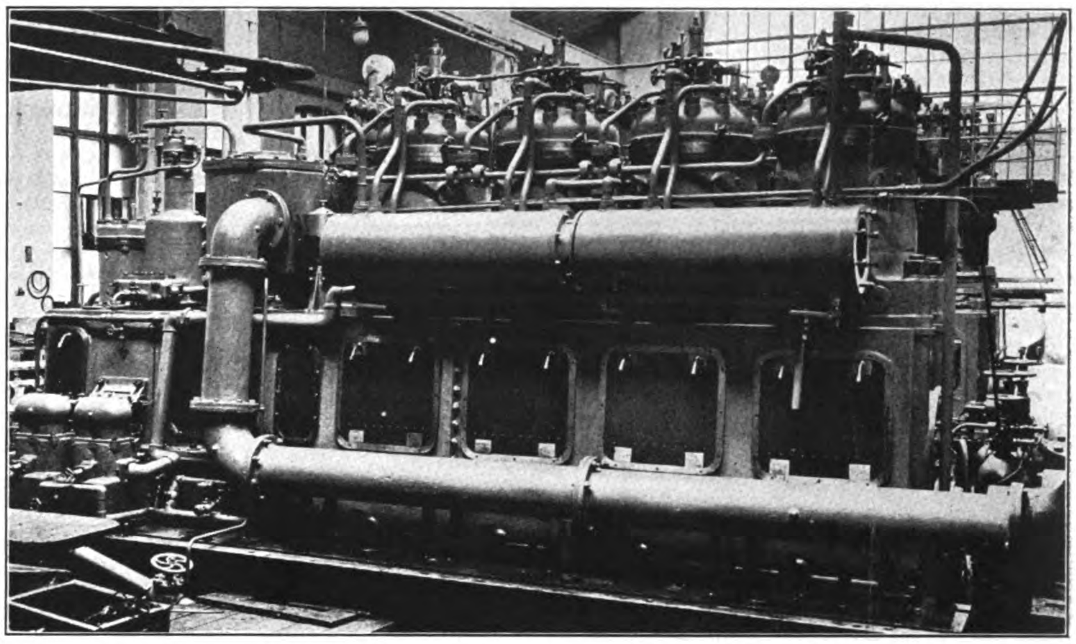
In order that this end may be accomplished with simple means, the camshaft is just like in an ordinary four-cycle engine running with half the engine speed, which with regard to wear undoubtedly is an advantage. The cams for normal running are provided with two lobes, at 180° opposite to each other, while the cams establishing the four-cycle of course only have one lobe. All three cams for each cylinder are keyed upon a sleeve which can slide upon the hollow camshaft. This sleeve is connected to a small shaft inside of the camshaft by means of a key which slides in slots of the camshaft.

All fuel-pumps are placed between the first working-cylinder and the scavenging pump and are driven by a small intermediate shaft which in turn receives its motion from the camshaft by means of spiral gears. One separate pump for each cylinder is always the most reliable construction, particularly on board of a vessel where all kinds of fuels may be purchased and not always sufficient facilities for cleaning the oil are to be found. The quantity of fuel for each stroke and with it the speed of the engine is, as usually, controlled by opening the suction valves of the pumps. This may either be accomplished by hand by means of the maneuvering-lever or mechanically by a Jahns governor, which prevents racing of the engine.

The scavenging-pump and the way in which the admission of the scavenge-air to the cylinder is controlled are of a decidedly original construction and have given excellent results. The air-pump is double-acting, and is calculated to deliver 1.4 times as much air as corresponds to the displacement of the working-pistons. The pump-piston consists of a plain disk, a steel casting of conical shape so as to give the piston itself as well as the cylinder-heads a strong form. The piston is guided by the trunk cylinder which is bolted to its lower side and which also serves as crosshead. Suction and pressure valves are replaced by a horizontally arranged cylinder which rotates at only one-third of the engine speed and therefore is provided with three channels for the suction and three channels for the pressure line.

The air is taken either directly from the engine-room, whereby a very efficient ventilation is established, or from the outside, which is to be preferred during the cold season.

The scavenging-pump delivers the air to a collecting pipe of large diameter. The connection between this pipe or receiver and the working-cylinders is controlled by vertically arranged rotary slides, driven by means of bevel-gears from the camshaft. These slides prevent the exhaust-gases from entering the receiver and thereby fouling the same as well as the scavenging-air and, what is of greater importance, they determine the beginning and the end of air admission to the cylinders, thereby greatly increasing the efficiency of the engine by using the scavenging-air economically.

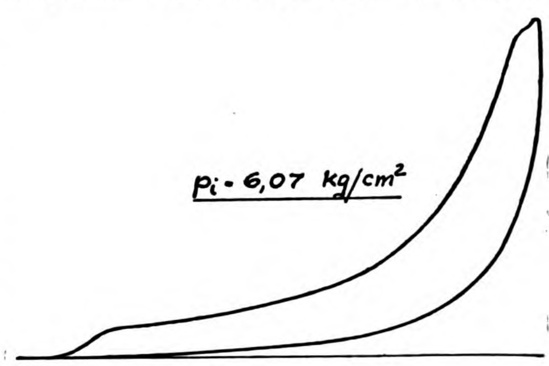


Back view of the Nobel 600-shaft h.p. 2-cycle Diesel engine showing air-suction and exhaust manifold

The compressor has three stepped stages The upper part of the piston serves the high-pressure, the intermediate part with the largest diameter serves the low-pressure with its upper side and the medium pressure with its lower side. As may be computed from the dimensions, the compressor is of ample capacity to take care of the largest consumption of compressed air which may reasonably be expected while maneuvering. The air receivers are watercooled and partly located within the engine frame, partly entirely separately from the engine.

By means of links and levers the connecting-rod of the compressor actuates three water-pumps; one for cooling the piston, the second for cooling the cylinders and cylinder-heads and the third delivers water for various purposes on board.

Force-feed lubrication is provided for the cylinders, main-bearings and by a system of swinging-



Typical indicator card

pipes also for the piston-pins. The crank-pins are as usually lubricated by centrifugal rings.

Maneuvering

The maneuvering platform is built up at a fair height between the two symmetrically arranged engines. From this platform all necessary maneuvers are easily controlled by means of three rather long levers for each engine which are within convenient reach of the operator. Also the necessary valves for compressed-air may be opened and closed from this platform.

The engine is started by placing the starting-lever into start position. Thereby compresesd-air is admitted to all cylinders and the engine is started, no matter which position the throws of the crankshaft occupy. After a few revolutions the lever is moved into its normal position; the air is thereby cut-off and fuel is admitted to all cylinders. It is of course excluded that fuel and compressed-air can get into the cylinder simultaneously. The starting-lever also actuates a valve which in a reliable manner admits or shuts-off the compressed-air, thus avoiding the inconvenience of opening or closing the air-reservoirs by means of hand-wheels.

The second lever controls the speed of the engine, as already mentioned, by regulating the fuel supply from the fuel pumps. In this way it is possible to vary the speed between 50 and 250 r.p.m.; it actually is possible to shut off the fuel supply altogether and thereby to stop the engine in this manner. This, however, is more suitably effected by moving the starting-lever into the stop position which puts the fuel-pumps out of action and removes the cams for the fuel as well as for the air-valves out of the reach of the corresponding levers.

When reversing, the engine is first stopped in the way just mentioned, thereupon the cams are, by means of the reversing lever, shifted into the position required for running astern, and the engine is started again as described above.

The levers are mechanically interlocked so that the reversing lever only can be shifted when the starting lever occupies its stop position.

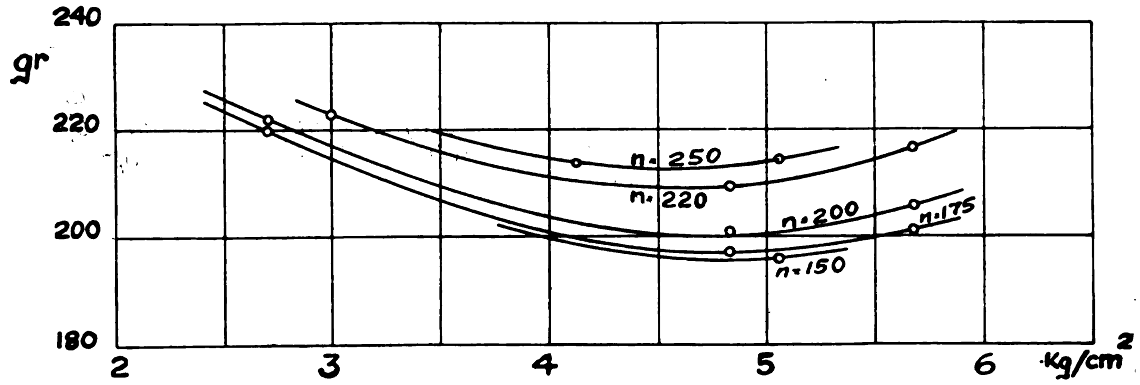
The extreme ease with the direct reversing is accomplished manually without any servomotors, neither pneumatic nor hydraulic, for the shifting of the cams cannot be emphasized strongly enough. The entire mechanism is simple, absolutely positive and foolproof.

Reversing can easily be accomplished within 10 as repeatedly demonstrated during the official trial seconds, but may even be forced within 6 seconds tests.

Official Tests

These tests took place during September, 1915, under the direct supervision of the director and a number of highly qualified engineers of the company which had ordered the machines. At first the engines were subjected to an endurance test at the rated load, then they were run under exceedingly varying loads under similar conditions as might be expected under actual operating conditions.

The load was established by an hydraulic Heenan & Froude brake N:r 6, the brake and the weights being carefully checked. As fuel a crude naphtha of Nobel Brothers' production was used, possessing a specific gravity of 0.885 at 15° C. and a heating-value of 10,000 cal/kg (18,000 b.t.u./lbs.). Besides the fuel, the lubricating-oil and the cooling-water consumptions were measured and readings of the temperatures of the air, water and exhaust gases taken at regular intervals. The exhaust-gases were analyzed with an Orsath apparatus, and of course at all loads indicator-cards were taken, of which a typical example, is given. The following table shows some of the most important results. Some of the figures are of considerable interest and are given here, as they may be of assistance to the student and to designers of similar engines.



Fuel-consumption per b.h.p. at constant speeds

The lowest fuel-consumption recorded was 196.3 g. or 0.43 lb. per b.h.p. hour. The consumption of lubricating oil was 3 gram/b.h.p., while the lubrication was very liberal as customary for new engines on the test-bed. It may be mentioned that in actual service lubricating of engines belonging to the Kaukas-Merkur (Caucus & Mercury S. S. Co.) was done very economically. The main bearings, for instance, were lubricated with masut, a cheap fatty oil, which afterwards was burned for firing the donkey-boilers on board.

Relations between fuel-consumption, speed and mean-effective pressure are shown in the above chart. It is to be noted that the engine worked more efficiently at lower speeds. While this is quite normal, as slow-running engines as a rule are showing better efficiency than high-speed engines, in the engine described also the scavenging exerted a great influence; at lower speeds the scavenging is done more thoroughly and with less loss through eddy currents. Moreover the air pressure and with it the power consumed by the pump is essentially decreasing with the speed. This is of course of the greatest effect upon the efficiency of the engine. At normal speed, that is at 210 r.p.m., the scavenging-pump consumed 44 ind. h.p. or 5.7% of the total i.h.p. of the engine.

TEST OF A NOBEL-DIESEL 2-CYCLE ENGINE

Number of tests	1	2	3	4	5	6	7	8	9	10	11	12	13
Rev. p. min. . . . n	211	200	206	175	176.6	173	149	145.4	223	220	220	247.5	250
Brake horsepower . . . Ne	598	667	326	276	500	577	446	291	391	624	733	598	749
Mean effective pressure . . . pe=kg/cm2	4.83	5.68	2.7	2.7	4.83	5.68	5.10	3.41	2.98	4.83	5.68	4.12	5.10
Mean indicated pressure . . . pi=kg/cm	6.24	7.23	4.17	4.03	6.18	7.12	6.52	5.18	4.66	6.34	7.45	5.92	6.69
Ind. horsepower . . . Ni	772	849	504	412	639	723.5	570.5	442.5	610.5	819.5	960	860	981
Mechanical efficiency . . . Ne/Ni . . %	77.5	78.5	64.7	67.0	78.3	80.0	78.2	65.8	64.0	76.2	76.4	69.5	76.3
Compressor pressures:													
Low pressure . . . kg/cm2	1.8	1.8	2.3	2.3	1.8	2	2	2	2	1.6	1.6	1.9	2
Medium pressure . . . kg/cm2	7	7	9	9	8	8.5	9	9	8	7	7	7.5	7.5
High pressure . . . kg/cm2	60	60	60	60	55	60	55	55	60	60	60	65	70
Scavenging pump:													
Temperature of the incoming air . . . °C	12	12.5	13	13	15	14	14	15	13	13	12	9	10
Temperature of the scavenging air . . . °C	38	39	40	36	37	37	37	36	43	43	43	44	45
Pressure of the scavenging air . . . kg/cm3	0.12	0.12	0.12	0.11	0.11	0.11	0.10	0.10	0.14	0.14	0.14	0.17	0.17
Fuel consumption:													
Total consumption per hour . . . kg	120.3	140.3	74.0	60.8	98.6	116.4	87.6	68.0	86.6	130.2	159	128.2	159.4
Per BHP and hour . . . gram	201	206	222	220	197.5	201.5	196.3	233	233	209.5	217	214	214.5
Cooling water:													
Temperature of water admitted . . . °C	9	9	9	9	9	9	9	9	9	9	9	9	9
Temperature of water discharged													
a) from the cylinders . . . °C	37	40	30	26	39	40	49	38	29	38	41	29	33
b) from the pistons . . . °C	37	42	31	30	35	35	37	33	28	33	38	31	40
Water consumption													
a) by the cylinders . . liter/BHP . . .	16	15.5	32	32	18	15.2	17	25	25.6	16	15.3	21.4	17.3
Exhaust gases:													
Temperature . . . °C	278	320	180	160	250	289	232	175	202	295	358	273	336
Percentage CO2 . . .	4.5	5.3	3.5	2.8	4.6	5.0	4.0	3.5	3.7	4.6	5.5	4.0	5.0
Percentage CO . . .	14.5	13.1	15.9	16.7	14.2	13.4	15.1	16.1	16.1	14.4	12.7	14.5	13.6
Barometric pressure . . . mm Hg	750	750	750	750	750	750	750	750	750	750	750	751	751

(1kg/cm2= 14.22 lbs/sq. inch)
(1 kg=2.2 lbs.)

Tests showed that the most favorable mean-effective pressure for this engine was 4.8 kg/cm² (68 lbs./sq. inch), a figure which had been chosen as a base when designing the engine.

Big Submarine Engines

Results gained must be considered as very good, especially as it was the first engine of its kind which was built at a time when everything was suffering from the stress of war; it was assembled and delivered to the customer without any alterations. Engines built according to the same principle were installed in a number of Russian submarines. They developed 1,320 b.h.p. at 350 r.p.m. in eight working cylinders.

Unfortunately political conditions prevented a further development of this engine in Russia, but the Nobel-Diesel Works have now succeeded, in spite of many obstacles, partly of an economic nature, to build a new engine, designed on the base of their former experience. This engine, which at the present time is nearing its completion, is to develop 1,600 to 2,000 b.h.p. at a speed of 110 r.p.m. It is equipped with crossheads and guides and is provided with a number of improvements. This engine was shown in your August, 1921, issue on page 649 in course of erection. Results obtained with this engine will be watched with great interest.

REPRODUCING "MOTORSHIP'S" ARTICLES

Frequently publications in various parts of the world reproduce articles of "Motorship" or make extracts from the same. We would be glad in the future if all publications would put the words "New York" in parenthesis after our name when making the usual acknowledgment. This courtesy will be greatly appreciated. All articles in "Motorship" are copyrighted.

DIESEL-ENGINE POWER IN FLOATING DRY-DOCK

In the 46,000 tons floating dry-dock at the Wilton Yard, Schiedam Holland, a 330 b.h.p Diesel-engine is used for generating power for driving the auxiliary machinery.

PETER B. KYNE AND MOTORSHIPS

Although a little late, we recently read a very excellent novel on Pacific Coast shipping entitled "Cappy Ricks," by Peter B. Kyne, the well-known author. It is one of the most interesting books on the shipping industry we have yet read. Incidentally, Mr. Kyne shows that he is fully conversant with the advantages of Diesel-driven motorships. Matt Peasley, one of the principal characters of the story, is negotiating for a steamship 455 ft. long by 58 ft. beam and 31 ft. draft and of 7,500 tons net register, propelled by a triple-expansion steam engine of 2,000 i.h.p. To the owners Peasley says:

"I'll give you two hundred and fifty thousand dollars for the steamer 'Narcissus'; but when you turn her over to me I want a ship, not a piece of floating junk. You'll have to ship a new crankshaft, rewind the main motor, renew the Manila lines, overhaul the standing, rigging, retube the condensers and dock her before handing her over to me. She's as foul as any hulk in Rotten Row."

"Why, that will cost in the neighborhood of forty thousand dollars—nearer fifty," MacCandless declared. "I know. But for three hundred thousand dollars I can go to Sweden, build a smaller vessel than the 'Narcissus,' have her right up-to-date, with two-thousand-horsepower oil-burning motors in her; and the saving in space due to motor installation, with oil tanks instead of coal bunkers, will enable me to carry fully as much cargo as the 'Narcissus.' Also, I'll burn six tons of crude-oil a day to your forty tons of coal a day in the 'Narcissus.' I'll employ eight men less in my crew, and have a cleaner, faster and better ship. The motorship is the freighter of the future, and you know it. Your 'Narcissus' is out of date, and I'm only offering you two hundred and fifty thousand dollars because I can use her right away."

High-Pressure Oil-Engines for Small Craft

Some Remarks on the Brons Type of Oil Engine

BY RICHARD D. WATSON

WHILE it is no doubt true that the Diesel engine, in its smaller sizes, has a serious rival in the hot-bulb type, it is equally true that they both have a competitor in the Brons engine. When it is considered that this engine can be, and indeed is, actually made in sizes as small as 1½ b.h.p. per cylinder, possessing at the same time practically all the advantages of the Diesel with only a fraction of its complication, the possibilities of this system are at once apparent. It has been argued the principle upon which the engine works, renders the actual firing point of the charge a matter of guesswork, depending largely upon the size of the holes in the fuel-up, and varying with different fuels. Theoretically this is true, but in practice it is found that the Brons engine is capable of very good regulation, more especially if it is provided with a fuel-pump, having a variable stroke, in place of the original gravity feed to the fuel-cup.

One of the most surprising features of the very small sizes of these engines is that the higher the speed the better the ignition device appears to function. The time-element which might very reasonably be expected to have an important bearing on the operation of the fuel-cup, owing to the period necessary for the compressed-air from the cylinder to enter the cup through the small holes, and the preliminary explosion to take place in the cup, seems to have little or no bearing in these circumstances.

As an example of the operation of the Brons engine in marine service, I quote from a letter recently received from the South Seas. The schooner on board which the letter was written is provided with a Deutz-Brons engine, and has been in commission for a number of years trading among the islands. The paragraph to which I have reference, reads, "The engine is giving excellent service, despite the facts that it is no longer in its first youth, and that it is left to the care of a native boy. The small holes in the cup give no trouble in plugging up with carbon, and the auxiliary valve in the interior of the cup requires only an occasional regrinding. There are several vessels in these waters using Brons-type motors for auxiliary power, and they are all giving the same class of service as this one."

Several concerns have taken up the manufacture of these engines, but as far as I am aware the system is little known. I am by no means an advocate of the employment of the unskilled operator, for no machine, however simple, will function efficiently without a reasonable amount of care, and the fallacy that it will do so has brought more than one excellent engine into disrepute. The sentence quoted above is merely referred to for purposes of comparison, for no one would ever consider leaving a Diesel engine to the care of a native oiler. In the matter of weight there is little or no difference, the compression pressure of the Brons engine being about the same as that of the Diesel, and consequently the general construction of the engine must be equally rugged, more so if anything, because of the tendency of the Brons type to pre-ignite, owing to change of fuels, this tendency being much more pronounced than in the Diesel engine. In the latter the point of injection is fixed mechanically, and the fuel entering the combustion-chamber in a highly atomized form, ignition is practically simultaneous, while in the other system under discussion, the chief actors in determining the actual firing-point are the specific gravity and flash-point of the fuel and the area of the holes in the fuel cup. Thus the point of ignition may be retarded by decreasing the size of the individual holes, but keeping the combined area the same by increasing the number. In the same way, a heavier fuel will call for the larger holes, and to obtain the best results the cup should be changed when a different grade of fuel is to be used. The fuel economy of the Brons-type is remarkably good, being superior to that of the surface-ignition engine, and is indeed on a par with that of the Diesel. The engine is in every way applicable to the different classes of work for which the Diesel is used, and being capable of close regulation, is used in many cases for the direct driving of electric generators. When properly constructed and maintained, the exhaust is practically clear and the operating troubles are very much less than those of an air injection engine. Being a vastly simpler machine in every way, it does not require the highly skilled attention, which contrary to all argument is, in my opinion, a sine-qua-non to the successful performance of the Diesel engine. The causes of failure to operate properly are few in number, and easy to trace and remedy.

Excessive smoking may be caused, in the gravity-fed type, by the fuel needle-valve failing to seat, and in those engines where the charge is supplied by a pump, a weak spring in the check-valve at the fuel-cup will produce the same results, owing to the fact that as the oil is timed to enter the cup on the suction stroke, the vacuum in the cylinder will cause the fuel in the pipe beyond the check-valve to be drawn into the cup. This latter condition only applies to those particular engines which are not provided with an auxiliary air-valve in the fuel-cup, and which depend upon the small holes to fill the cup from the air already in the cylinder.

In those in which the auxiliary valve is used, trouble has at times been experienced by the seat of its valve gumming up, with the result that the primary compression in the cup is lost, when of course ignition will not take place and the engine refuses to function at all. This is most noticeable when using heavy oils, or those with an asphaltum base, and the trouble can usually be avoided by running the engine on kerosene for a few minutes prior to shutting down. Occasionally the seat of the valve is found to have been made too wide in the first place, and a film of oil is deposited upon it, and soon baked to a hard carbon, which prevents the valve from closing. The obvious remedy is to reduce the width of the seat to little more than a knife-edge, when it will be found that grinding in is much less frequently required.

The Brons engine has not as yet made the headway in this country, to which its obvious merits entitle it, but I am strongly of the opinion that some modification of this type of prime mover will be adopted for the very small sizes of marine oil-engines in future. And nobody who is conversant with the conditions obtaining on the Pacific Coast, can deny that the "Small Boat Trade" is not a very important item, not only in the oil-engine business in general, but also in the entire industrial situation of the Coast. Another field which shows great promise is of course the tractor trade, and no doubt the remark that a marine engine builder can produce a good stationary engine, though a stationary engine manufacturer does not always build a good marine engine will hold good in this case.

[The Brons type of engine is manufactured in the U. S. A. under several names, including the Hvid, Burnoil, Cummins, Dodge, Pittsburg, etc., all under Hvid licenses.—*Editor.*]

WELDING REPAIR TO DIESEL ENGINES

"Shipbuilding & Shipping Record" of England gives an account of an interesting electric weld made to a 600 b.h.p. Sulzer Diesel engine. The parts in question were of cast-iron, and, as is well-known, the welding of cast-iron is at all times a difficult matter; in this particular case the difficulties were increased because the castings could not be preheated.

Some time ago in the normal running of the station a 600 b.h.p. three-cylinder Sulzer-Diesel engine was shut down for some minor adjustment and the jacket cooling water allowed to continue circulating. During the period of rest some water found its way into the cylinder through a porous part of the cylinder head. When the engine was again started by means of compressed air the presence of the water resulted in the fracture of the base of the main "A" column of the engine; the crack on one column extended right round the front half and about two-thirds round the back half of the column through metal varying from 2½ in. to 3½ in. thick, whilst the other column was cracked at the ends both inside and outside. After the accident the crack closed up to about one-eighth of an inch wide. Work was commenced by chipping-out metal surrounding the crack from both sides of the casting to form a "V" for the reception of the new metal. Approximately 700 ft. of A.W.P. electrodes were used, representing about 0 lb. of added metal. The necessary current was taken from the mains, the only equipment required consisting of a portable resistance, electrode holders and cables. A portable air compressor was used for the pneumatic-tools for chipping the "V." So successful was the welding process that the engine was running on load within four weeks from the commencement of the repair and at the time of our inspection was in normal operation. These notes perhaps convey but a vague idea of the size of the repair, but it is quite obvious that the time expended upon it must have been much less than would be necessary for obtaining a new "A" casting and its fitting and erection on the engine. In addition, of course, the welding cost much less than a replacement casting would have done, and the job is an excellent illustration of the possibilities of this type of work.

"Colon," a new San Francisco Tug Boat fitted with Atlas Imperial Diesel engines

Contents copyright 1921 by Miller Freeman & Co.

MOTORSHIP

Trade Mark, Registered

Published Monthly in the Interests of Commercial and Naval Motor Vessels and for Recording International Progress of the Marine Internal-Combustion Engine

Head Office: 282 WEST 25TH STREET, NEW YORK, N. Y.

Telephone Watkins 9848

417 Montgomery Street, San Francisco 71 Columbia Street, Seattle, Wash.

Cable Address—Freemote New York

Copies of "Motorship" can be secured from the Atlas Publishing and Distributing Co., London; from Smith and Wyman's railway bookstalls in Great Britain; also from Julius Springer of Berlin, or from the American News Co., New York City, U. S. A., and on the Pacific Coast from the San Francisco News Co.

Published by MILLER FREEMAN & COMPANY

MILLER FREEMAN....President
THOS. ORCHARD LISLE....Editor
A.M.S. Naval Engineers. A.M.I. Marine Engineers
RUSSELL PALMER....Manager

Subscription rates: U.S.A. and Mexico, $3.00 per year; Germany, 300 marks; Canada and foreign countries in the postal union, $3.50. Single copies: United States, 25c.; Great Britain, 1/6. Other countries, 35c.

"Motorship" is published on the 25th of the month prior to date of issue, and all changes in and new copies for advertising must be in the hands of the publisher prior to the 5th of each month. Notice of discontinuance of advertising must be given before the 1st of the month, preceding issuance.

THE QUESTION OF FUEL

One of the "kicks" against the marine Diesel-engine frequently made by domestic shipowners is that they are not successful when using heavy boiler-oils, and that difficulty is likely to be encountered in some parts of the world owing to lighter fuel-oil being unobtainable. We are inclined to think that there is considerable misconception in existence in regard to this fuel-question. Quite a number of motorships have been running on fuel known as Diesel-oil, which may be said to be practically gas-oil or Solar-oil. This is an oil used in every city by gas-works in connection with cleaning lighting-gas, and is now to be obtained almost anywhere in the world, because the various oil-companies are making a special point of maintaining a supply at all leading bunker stations. True, it was difficult to obtain during the war and during the two following years, but this is no longer the case.

Discussing the question of fuel-oil in our issue of April, we raised a query as to whether the question of fuel-oils was really important in the case of motorships for the following six reasons, and indicated that the grade of fuel should be decided by the particular requirement of each individual ship and her route. The reasons are as follows—

(A) Saving is comparitively slight if boiler-oil is used instead of Diesel-oil.

(B) Motorships are not dependent upon overseas bunker-stations, but can pick-up oil where it is cheapest.

(C) Need only bunker two or three times per year, unless selling part bunker-oil as cargo in Great Britain, Scandinavia, France or other countries that have little or no natural fuel-oil.

(D) When called upon, motorships can use heavy residues if the same are heated by utilizing exhaust-gases, although the use of crude-oil means more work for engine-room crew.

(E) Grade of fuel advisable largely depends upon skill and conscientiousness of engineers-in-charge.

(F) Using Diesel-oil on motor-ships engaged in the U. S. A. to Europe service has certain benefit of its own, because there is always a steady demand for this class of oil for new motorships leaving Europe on maiden-voyages, also because need of this oil for cleaning gas in large city gas-plants. This enables surplus bunker-oil to be sold at prices much higher than those paid.

While a motorship can sell her surplus bunkers at a considerable profit, a steamer cannot do so without infringing upon her cargo-space, also because the field for disposing of surplus crude oils is more limited.

Nevertheless, on a number of routes it is advantageous if a motorship can use regular low-grade boiler-oil, especially if her owners are also operating steamships on the same routes, because then they are only obliged to contract with the oil-companies for one grade of oil. Also, their motorships can furnish the surplus bunker-oil to the owner's own steamships when they meet in a foreign port, where to the cost of bunker-oil is added tanker transportation costs of the oil-companies. This will enable the motorship owner's steamships at times to carry more cargo, instead of having to carry sufficient fuel-oil for a return voyage, and in this manner increase the carrying-capacity of their existing steamship fleet, which opens a new argument in favor of motorships.

Incidentally it is worth noting that the Western Australian Government's combination cargo and passenger motorship "Kangaroo" has had a special fuel-tank of 500 tons capacity fitted in the hull for the purpose of supplying a refrigerating station at Windom, West Australia, with fuel oil and the supply will be taken in at Singapore or Balikpappan. The refrigerating station is operated by twin Sulzer 200 b.h.p. Diesel engines. American motorships in a like manner could be used to supply foreign land stations with fuel-oil.

There is no doubt that Diesel-engines will operate on boiler-oils when in the hands of competent engineers, and additional competent operators can be obtained by the owners selecting good men and sending them to the engine-builders' works while the motors are under construction. This has been proven in the case of a number of vessels, notably that of the Alaska Steamship Company's motorship "Kennecott," which is the first large All-American steel general freighter. This vessel has been running with great success on boiler-oil of 16.7 gravity. Use of this oil is facilitated by the adoption of a simple scheme of heating the fuel-oil by means of a device on the exhaust-gas silencer.

Furthermore, Diesel engines have run for long periods on Mexican crude-oil of as low as 14 degrees gravity. Opinions of many American shipowners regarding the use of boiler-oil was formulated by the discovery that a number of foreign motorships were using Diesel-oil. This was largely due to the fact that the daily consumption was so low that there was little to be gained by using heavier oil at slightly lower cost. It is generally conceded among engine-builders that the lower the revolution speed of the engines, the heavier grade of oil that can be used. Possibly this is a partial reason for the successful operation of the Doxford Diesel-engine on 14 deg. oil. Various navies of the world found that crude-oils were not very suitable for running high-speed submarine Diesel-engines.

PROTECTION FOR DRY-DOCKED STEAMERS

Recently a large new American steamship caught fire while in a New York dry-dock, which has frequently occurred to a number of other steamers in similar circumstances. As the vessel was high out of the water her fires were drawn and her boilers dead, so that her pumps could not be started. Consequently, considerable damage was done before the city's fire-boats could reach her, altho the skeleton crew aboard vainly endeavored to put out the blaze with chemical extinguishers. When the steamship "Alaska" recently ran on a rock, flooding of her boiler-room, prevented her continuing wireless signals. And, we must not forget the awful horror of darkness in the terrible "Titanic" disaster.

We strongly urge that in the interests of the lives of the crew and safety of the vessel and cargo, every steamship carrying the United States flag be fitted with an independent 25 K.W. to a 100 K.W. Diesel-Electric generating-set in the engine-room flat, or in a deck-house, for the purpose of instantly supplying electric-current to the fire and bilge pumps at all times of emergency, such as when the vessel is on fire, or when her engine-room is flooded after some accident in harbor, or at sea. The same electric-current could also be used for the "wireless" and lighting when the main machinery is put out of action, the latter being an occurrence all too frequent at sea. The Diesel-electric set could be started in ten seconds.

So great is the importance of such an installation that the legislation to this effect should be enacted immediately. And, it would pay insurance companies to offer a special reduction in fire rates to steam-driven vessels thus equipped. The cost of such an installation will be from $3,000 to $15,000 according to size of ship and power of plant. The White Star and Holland-America liners are already equipped with Diesel-electric emergency sets on deck, with an engineer always on duty.

BETHLEHEM S. B. CO. AND DIESEL ENGINES

Some time ago we published a report that the Bethlehem Shipbuilding Corporation had acquired a Camellaird-Fullagar Diesel-engine license, but this was denied by the Company. However, Joseph J. Tynan, general-manager of the Union Plant of the Bethlehem Shipbuilding Corp., in an interview recently stated that they had secured the rights to build the best Diesel engine in the world, and would build them at the Union Plant; also that their experts had been making an intensive study of the *new* engine in Europe. Mr. Tynan believes that there is going to be an immediate improvement along the main lines of industry, and that we are on the eve of the greatest industrial revival the world has ever seen. Nothing is known regarding the above license at the New York offices.

REMARKABLE GROWTH OF MOTOR-SHIPPING REVEALED BY LLOYDS

Presumably the most accurate statistics of shipping are issued by Lloyds because of their unusual facilities for securing first-hand data in all parts of the world excepting Germany. Therefore, the growth in the number of mercantile motorships shown in the latest Register is most remarkable as well as interesting. There are now no fewer than 1447 motorships aggregating 1,263,000 tons gross (2,000,000 tons d.w.c.) in service, compared with 290 vessels totalling 234,000 tons gross in 1913. What makes this growth extraordinary is that it has taken place during a period when development-work was tremendously hampered, and vast sums of money and time that could not easily be spared were needed for the necessary experiments. Including motorships under construction the grand total reaches about 1,550 craft aggregating 2,500,000 tons deadweight capacity. In addition between 20 and 30 motorships of 4,000 to 12,000 tons d.w.c. are under construction in Germany, making another 200,000 tons. In connection with the increase in the number of motorships under construction it is of considerable significance to bear in mind that the only freighter ordered in Great Britain during the last five or six months is that for a 10,350 tons d.w.c. Diesel-driven motorship by a Newcastle shipowner, which order has recently been placed.

Through Some Oil-Engine Works In Germany

Report of Mr. R. Hildebrand, Engineer of the Oil-Engine Division of the Fulton Iron Works Co., St. Louis, Mo., after his return from abroad, relating to the development of Diesel Engines in Germany during the recent years.

OWING to the general industrial depression and to the very fluctuating cost of fuel-oil in Germany, the present demand for stationary Diesel-engines is small, and consequently comparatively few of these engines are under course of construction. Conditions in the line of marine Diesel-engines are generally slack. Before the war, Germany made great effort to develop large two-stroke double-acting marine Diesel engines. Two of its concerns undertook, at that time, to build each a two-stroke Marine Diesel engine of 12,000 h.p. in six cylinders. These large engines were thoroughly tested in the shop, as already indicated in "Motorship." Then they were taken down to make room for other work, as, due to the war, there was no immediate demand for engines of this sizes.

It is to be greatly regretted that the valuable experiences gained by these two large two-stroke marine engines are not published, because they unquestionably would be of great value to the engineering world.

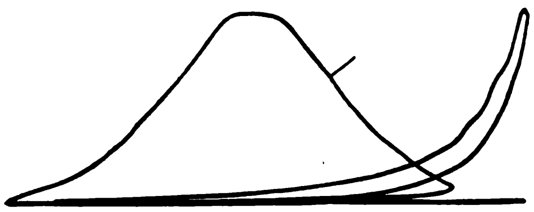


Fig. 1

The majority of the German Diesel engineers are still convinced that the two-stroke engine, if properly developed, will be the most suited type for larger Diesel units. Regardless of this fact at present, the development of the two-stroke engine seems to be dormant, because there is now not sufficient means to carry through expensive experiments. This accounts for the fact that some of the manufacturers who formerly did much for the development of the two-stroke marine engines are now building four-stroke sets.

The most interesting engines that Germany has built during the last seven years are high-speed engines as used for submarines and electric light on board ship. It cannot be denied that Germany has developed this kind of engine to a remarkable degree. As these engines have been well described in the "Motorship," no further comments are needed.

Germany, like other countries, takes a keen interest in solid-injection Diesel engines. The writer saw several engines of this type in operation. The most interesting of all was the Steinbecker engine, because its working principle is of a peculiar nature. As the majority of the Diesel engineers are interested in the development of solid-injection engines, the writer believes it will interest the readers of the "Motorship" to hear some practical results about the Steinbecker engine.

The Steinbecker engine has been described in the "Motorship" and it will be remembered that it is a Diesel engine without a compressor, which atomizes the fuel-oil by blowing it with great velocity into the combustion-chamber, by means of gases which are formed by exploding a small amount of fuel-oil in a hot retort.

The writer observed a four-stroke Steinbecker engine in operation with a cylinder 12 in. by 18.1 in., and with a speed of 210 r.p.m. The engine ran well! Using tar-oil as fuel, it gave a perfectly clear exhaust from no load up to 25 k.w., which was the maximum load obtainable. The latter is equivalent to about 40 b.h.p., including a belt-drive to and from a jack-shaft. Apparently the engine could have carried a considerably higher load. Figures 1 and 2 are cards taken during the presence of the writer, while Figure 3 is a card taken at a previous date. It can be noted from the cards that the initial pressure at normal load is somewhat higher than the pressure at the end of the compression. If the starting bottles were filled with products of combustions taken from the engine cylinder, i.e., if they are filled with gases up to a pressure equal to the initial cylinder-pressure, then the engine can easily be started with the said gases. Thus, the engine is started by means of accumulated products of combustion and not by high-pressure air. The fuel consumed is said to be 10 per cent below the one obtained with Diesel engines using compressed-air for injecting the fuel.

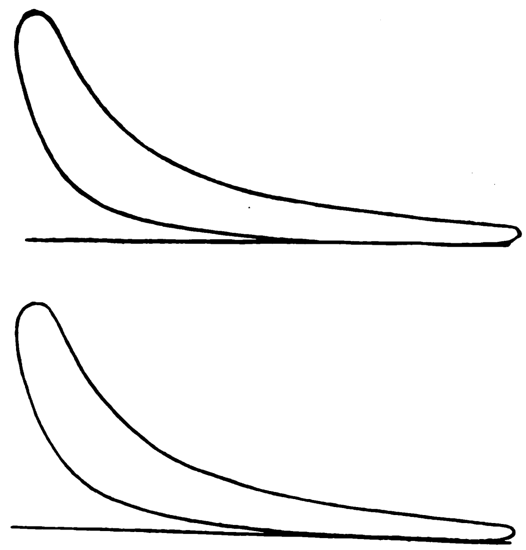


Fig. 3

The writer did not check up the amount of fuel consumed, but common sense tells us that a solid-injection engine, provided it gives a clear exhaust, (i.e., a perfect combustion), must have a better fuel-consumption than a Diesel-engine which injects the fuel by means of compressed-air, because the compressor consumes power, and the admission of cold injection-air into the combustion chamber is undesirable from the thermal standpoint. The omission of cold injection-air accounts for the fact that the Steinbecker engine showed a perfectly clear exhaust at no load, using tar-oil as fuel.

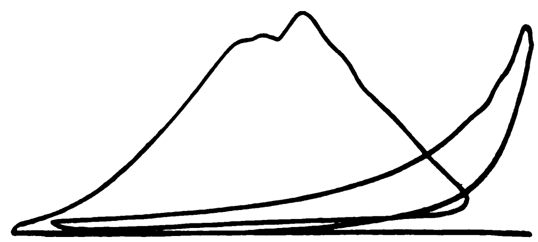


Fig. 2

From the mechanical standpoint, the Steinbecker engine is a much simpler and cheaper engine—omitting the compressor, the fuel needle-valve, the injection-air bottle, and the high-pressure injection-air piping. All these parts are expensive and a source of more or less trouble. Thus the Steinbecker engine has many good features and it is a type of engine which will have a future demand. Recognizing this fact, Krupp and other German concerns have purchased Steinbecker license. The writer observed several engines of this type under the course of construction during his visits to various factories.

It may be interesting to hear that the writer was informed while at the Krupp Shipyards at Kiel that this concern made a test on a Steinbecker engine, using fuel-oil containing over 30 per cent asphaltum, before they decided to build this type of engine, and that with this oil the engine gave a clear exhaust.

R. HILDEBRAND.

[Complete articles and illustrations of the Steinbecker oil-engine appeared in "Motorship" of July and August, 1920, and considerable reference was also made to it by Otto Alt, Chief-Engineer of Krupp of Kiel in his interesting contributions last year.—*Editor.*]

Motorship Construction at the Deutsche Werft

Ten Diesel-Driven Tankers and Freighters Now Building. Higher-Powered Vessels to Be Soon Laid-Down

DEPRESSION in the shipbuilding industry does not appear to have affected the various German yards particularly where Diesel-driven motorships are under construction. A recent visit to the Duetsche Werft at Gross Flatbeck, Near Hamburg, by our Danish correspondent showed such building to be quite active at the present time, and confirms reports previously published in "Motorship." At the same time this state of activity does not tally with the report made by Mr. Hildebrand of St. Louis, Mo., given elsewhere on this page, who called upon eight German firms engaged in Diesel engine construction.

Our correspondent states that the Deutsche Werft occupies sites on both sides of the river Elbe, with a frontage of 6,000 feet, and has 19 building ways, varying from 140 to 824 ft. length and that 6,000 men are employed. As also stated in "Motorship" (January, 1921, issue) this yard is working in conjunction with the Hamburg-America Line, the Allegemeinen Elektricitats-Gesellschaft. (General Electric Co.) and its subsidiary the Deutsche Oelmaschinen-Gesellschaft (German Oil-Engine Co., Ltd.) and the Gutehoffnungschutte. All the electrical machinery is being built by the A. E. G. The D. E. S. are sole concessionaries for the Burmeister & Wain Diesel engine licenses in Germany and Italy.

It was last January that we stated twenty 1,250 i.h.p. Burmeister & Wain type engines were building by the A. E. G.'s subsidiary. These are destined for merchant-ships at the Deutsche Werft. including the following:

No. of Vessels	Type	D.W.C. Tonnage	I.H.P Power
3	Freighters	8,000	2,500
2	Freighters	6,500	2,500
3	Freighters	5,500	2,500
2	Tankers	4,000	2,500
10		61,500 tons	25,000 i.h.p

In addition the Deutsche Oelmaschinen is building four Diesel engines of 2,250 i.h.p. each or 4,500 i.h.p. per twin-screw set for some motorships of 8,000 tons deadweight and of higher speed, the above craft ranging from 10 to 12½ knots. These hulls will shortly be laid-down.

Extended tests have been carried out at the Tug experimental plant, and it has been found that the engine-speed of 126 revolutions per minute will not result in propeller inefficiency.

The three Diesel-tankers will have the following dimensions:

Deadweight capacity	4,000 tons
Length	94 meters
Breadth	13 meters
Depth	8 meters
Draught	6 meters
Power	2,500 i.h.p.
Speed	11½ knots

As regards the 6,500 tons freighters, these will carry a few first-class passengers as well as cargo. Also provisions have been made to carry live stock such as cows, pigs, sheep on the starboard side forward. Their fodder is stored abaft of the chain locker. On the port side forward is the workshop and store-rooms.

(*Continued on next page*)

The dimensions of this class ship are as follows:

Dead-weight-capacity	6,500 tons
Power	2,500 i.h.p.
Length B.P.	114.3 meters
Breadth	15.7 meters
Depth	8.63 meters
Draught (extreme)	6.9 meters
Classification	Germanischer Lloyd * 100 A 4
Cargo-capacity	253,285 to 275,040 cubic feet

There are two masts and the stern is of the cruiser type. Fuel is carried in the double-bottoms, as well as ballast-water, and fuel is also carried in three tanks between the propeller-shafts. There is a fresh-water space of 130 cubic-meters. The total fuel-capacity is 1,118 cubic-meters, and space is provided for 15 cubic-meters of lubricating-oil.

The cargo space is divided as follows:

Hold 1	45,569 to	47,995 cubic ft.
Hold 2	53,540 to	57,743 cubic ft.
Hold 3	53,540 to	57,743 cubic ft.
Hold 4	16,422 to	18,117 cubic ft.
Between decks	84,214 to	93,442 cubic ft.
Total	253,285 to	275,040 cubic ft.

The capacities of the fore and aft peaks are 71 cubic-meters and 97 cubic-meters respectively. Forward the three hatches of 11.22 by 5.2 meters are served by 12 derricks and 8 electric-winches of A. E. G. manufacture, each of 5 tons lifting-capacity. Grouped round the engine casing on the starboard side are the quarters (in single-cabins) of the four engineers, and two 2-berthed cabins of the four-assistant-engineers. On the port side are the steward's cabin, two cabins for the carpenter and boatswain, another for two cooks, besides a shower-bath, a mail compartment of 30 cu.m. capacity, and a hospital. In the poop four motor-men are quartered in one cabin, three oilers in another, and 2 electricians and a boy in a third, on the port. While on the starboard side, the 12 men are berthed, four to each cabin. The men and the engine-room personnel have separate dining rooms.

Below the poop are the ice, chain and provision stores, while on the shelter-deck the 2nd, 3rd and 4th mates are accommodated together with the doctor, 2 stewards and 4 passengers in two-berthed cabins. Further, there are an office, bath, smoking and dining saloons and a pantry. Aft follows the kitchen with a separate wash compartment, next the fourth hatch of 8.58x5.2 meters dimensions, served by two derricks and electric-winches each of 5 tons capacity and by two 3 tons electric-winches and derricks. Here, on the port side, are also to be found the lavatory and on the starboard a lamp store. On the boat deck the captain has his sleeping cabin and saloon, and the first mate and the pilot each their cabin. On the flying bridge are chart pilot houses and the "wireless" compartment.

Next we will describe the 8,000 tons motor-freighters, which have the following dimensions:

Length B. P.	121.40 meters
Breadth	16.45 meters
Depth to S. D	11.67 meters
Draught, loaded	7.49 meters

Following the usual practice all the deck-machinery is electric-driven, and comprises 14 winches, of which two are of 3 tons and the rest of 5 tons lifting capacity—all of A. E. G. manufacture. The steering-gear, the windlass and a warping-winch are also electrically operated.

The engine-room arrangement is along standard plans. There are three 75 h.p. B. & W. type Diesel-driven generators which supply the current for the drive of the number of pumps and for the electric-light, for which latter purpose there is a transformer to 11 K. W. 220/110 volts, another being for the steering-gear. Only the 5 h.p. emergency compressor of 13 cubic meters capacity per hour at 80 atm. pressure is steam-driven from the oil-fired Hetsch burner, horizontal-tube boiler of 8 atm., pressure and 14 square meters heating-surface, that also supplies the steam for heating purposes.

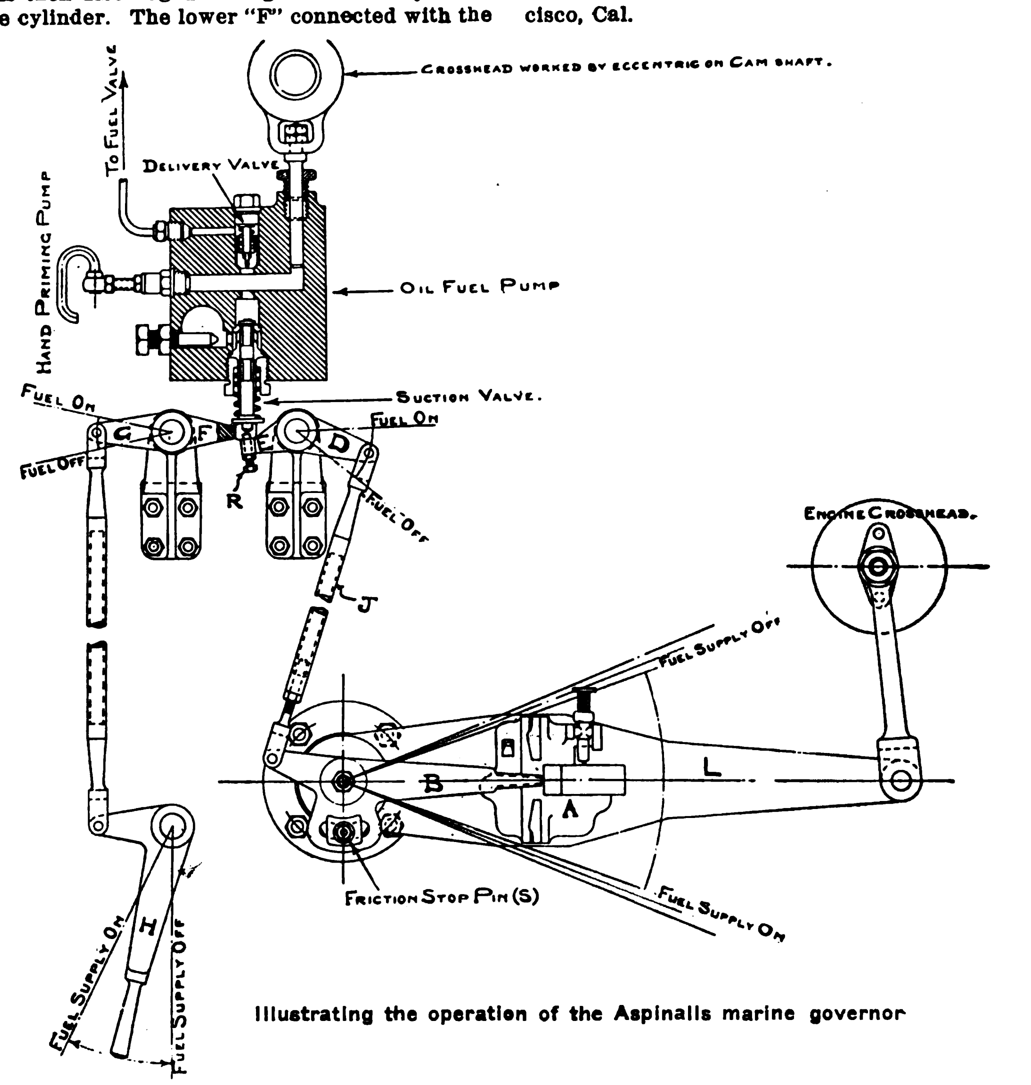
There is an electric driven air-pump of 75 K. W. and 360 cubic meters capacity per hour; two force-feed lubrication-pumps of 20 cubic meters capacity per hour; a spare force-feed lubrication pump of 2.4 cubic meters capacity per hour for the auxiliary Diesel engines; a daily fuel-pump of 50 cubic meters capacity per hour; two cooling-water pumps of 110 tons capacity per hour; a bilge-pump of 150 tons capacity per hour; two 3-cyl. crank-pumps; seawater box; a fresh water-pump of 3 tons capacity per hour; two 7 h.p. electric starting-motors, two starting-air tanks of 13 cubic meters content each; the main charge air-bottles containing 200 litres each; two spare ones holding 400 litres each; two silencers of 4 cubic meters content each; another of 0.6 cubic meters for the compressed-air; two daily fuel-tanks that have each a cubic-capacity of 7 meters; which suffices for 8 hours; a crude-oil measuring-tank of 1.1 cubic meters capacity; nine, 0.75 cubic meters lubrication-oil-tanks, main and auxiliary switchboards; and 11 K. W. 115-volt light dynamo; a 4 h.p. workshop engine; a blast engine of 14 cubic meters capacity per min.; a boiler feeding pump of a capacity of 0.8 ton per hour; an evaporator of 12 tons capacity in 24 hours for sea-water, and an evaporator pump of 0.75 ton per hour.

Other shipyards building Diesel-engined motorships are Blohm & Voss, the Tecklenborg Co., the Reiherstieg Co., the Weser Co., and the Howaldtswerke. The other steamship lines that have ordered these motorships are the Hamburg-American Co., Hugo Stinnes, the Hamburg-South America Line and the Hansa Line.

GOVERNORS FOR MARINE DIESEL ENGINES

Few ship's engineers are unfamiliar with Aspinall's governor, which has been adopted on many merchant steamships. In fact, its adoption on this class of vessel is so common as to be almost universally standardized. Therefore, it was only logical that the makers should have modified this governor to render it very suitable for the marine Diesel-engines of merchant motorships. So far as we are aware the Aspinall governor was first adopted for the motorship "Selandia" in 1912 by Burmeister & Wain, and has been installed in every motorship completed by them since that date, as well as by many other Diesel-engine builders. Therefore, some details of the design will be interesting to those engine-builders who till now have preferred to stick to governors similar to those used on land Diesel-engines. It is entirely automatic in its action, simple in construction and prevents racing in heavy weather, also shuts-off the fuel supply to the engines in the event of a broken shaft, or loss of propeller. It also prevents undue wear and tear to the delicate mechanism of this particular class of engine. It saves fuel owing to the fact that it cuts-off the supply when the propeller lifts out of the water, and at a time when it would not be doing any effective ship driving. With this governor fitted a vessel will make quicker voyages, and the engineers are relieved from standing-by the hand-regulating gear in heavy weather, and are thus at liberty to give proper attention to their numerous ordinary duties.

It is fitted to a suitable reciprocating-lever having for preference an angular movement of about 45 degrees and making about 80 double strokes per minute. The Governor "A" is adjusted to act at about 5 per cent above the running speed of the engines: when the predetermined speed is reached the large weight of governor is left behind on the downward stroke of the special lever "L," and on the upward stroke of the special lever "L" the bottom pawl on governor carries the engaging lever "B" into its upper position, which lifts the suction valve on oil fuel-pump off its seat through rod "J" and levers "D" & "E." When this action takes place the bulk of the oil-fuel instead of passing through the delivery valve to the cylinder is returned to the suction chamber, and the engines are then slowed down. The amount to which the suction-valve is lifted off its seat by the governor is regulated by the screw "R" which is set so that a small quantity of oil-fuel will pass through the delivery-valve and to the cylinder. When the speed of the engines has moderated, the large weight of governor drops into its lower position which allows the suction-valve for the fuel-pump to come on its seat, the full supply of oil-fuel is then discharged through the delivery valve to the cylinder. The lower "F" connected with the hand gear is fitted with a fork end which works outside the lever "E" of governor gear. With this arrangement the governor gear or hand-gear work independently of each other. The representatives in America for the Aspinall Governor Co. of Liverpool, England, are: John Platt & Co., 2 Rector Street, New York and the Plant Rubber & Asbestos Works, 537-539 Brannan Street, San Francisco, Cal.



Illustrating the operation of the Aspinalls marine governor

Further Discussion of Metten and Shaw's Paper

Including a Reply to Critics by the Authors—Comments of Motorship Virtually Endorsed

LAST month we published extracts taken from a number of comments on Messrs. Metten and Shaw's paper on Diesel-engines and motorships before the Society of Naval Architects and Marine Engineers, together with a few criticisms on the critics' remarks. Our opinions are virtually endorsed by the reply of Messrs. Metten and Shaw, as follows:

The Reply of the Authors

"**Mr. Fernald** has furnished an estimated formance of a comparatively small vessel having triple-expansion-engines, geared-turbines, and Diesel-engines, and for the last has selected engines of the B. & W. type He states that this comparison was worked up sometime ago when he was connected with the Shipping Board, and from which we are led to infer the Shipping Board based their decision not to embark on motorship construction at that time. If this is correct, this important decision was based upon incorrect data, as the B. & W. engines used in the comparison are two sizes larger than those in service on vessels of the same size and speed. The size assumed for the comparison is known as B. & W. type 6-275, and designed for 4,000 i.h.p. (total).

'The engine size that should have been employed in the comparison is actually two sizes smaller and known as B. & W. type 6-200, designed for 2,800 i.h.p. (for the two engines). These latter engines are the same as installed on the motorship "Oregon" and several similar vessels which have the same designed sea-speed as the Fernald vessel but have 5 ft. more between perpendiculars, 1 ft. more beam, and 6 inches more draft. The total weight of machinery, therefore, including spares, engineer's stores and water in the system is thereby reduced by using the proper installation from 795 tons to 540 tons. Also, the fuel-oil consumption is reduced from 13½ to 9½ tons per day, as actually obtained on the motorship "Oregon". For the motorship the cargo carrying-capacity, both cubic and deadweight, will be correspondingly increased, which taken with the decreased cost of machinery will show a decided economical advantage for the motorship over the steam vessels for the particular route in question. Mr. Fernald has failed to take cognizance of the fact that the twin Diesel-vessel will have a better propulsive efficiency than the single-screw vessel, due to the revolutions assumed for the latter. *The results arrived at by him are therefore incorrect and extremely misleading.*

"**Messrs. Smith and Dalcher,** of the Federal Shipbuilding Co., have also investigated what advantages there may be in the motorship and have furnished an estimated comparison by them of a vessel with geared-turbines and Diesel-engines. From the data given, the Diesel-installation is apparently based on an experimental engine, which is unusually heavy for the power. The shaft horse-power estimated as required for the motorship is about right, but the power used for the geared-turbine vessel is considered too small, due to the high turns of 90 r.p.m. employed for the single-screw, and which should not exceed 75 r.p.m. for the particular conditions, if the propulsive efficiency of the two vessels is to be kept the same.

"Had B. & W. engines type 6-275 (erroneously used in Mr. Fernald's comparison, and exactly suitable for the present vessel) been employed, the machinery would have been reduced from 1,052 tons, as given in Mr. Dalcher's figures, to 795 tons, or a saving of about 25%. Mr. Dalcher has used 0.35 lb. of fuel-oil per i.h.p. hour for all purposes at sea, giving 14.55 tons per day. If this is corrected to 0.31 lb., as obtained on B. & W. vessels, the consumption per day is reduced to 13 tons. Had a more suitable Diesel-engine installation been selected for the comparison, the 19% net earnings per year on the initial investment, as given, would have been very greatly improved, and would conform more with the figures of the authors in their comparison.

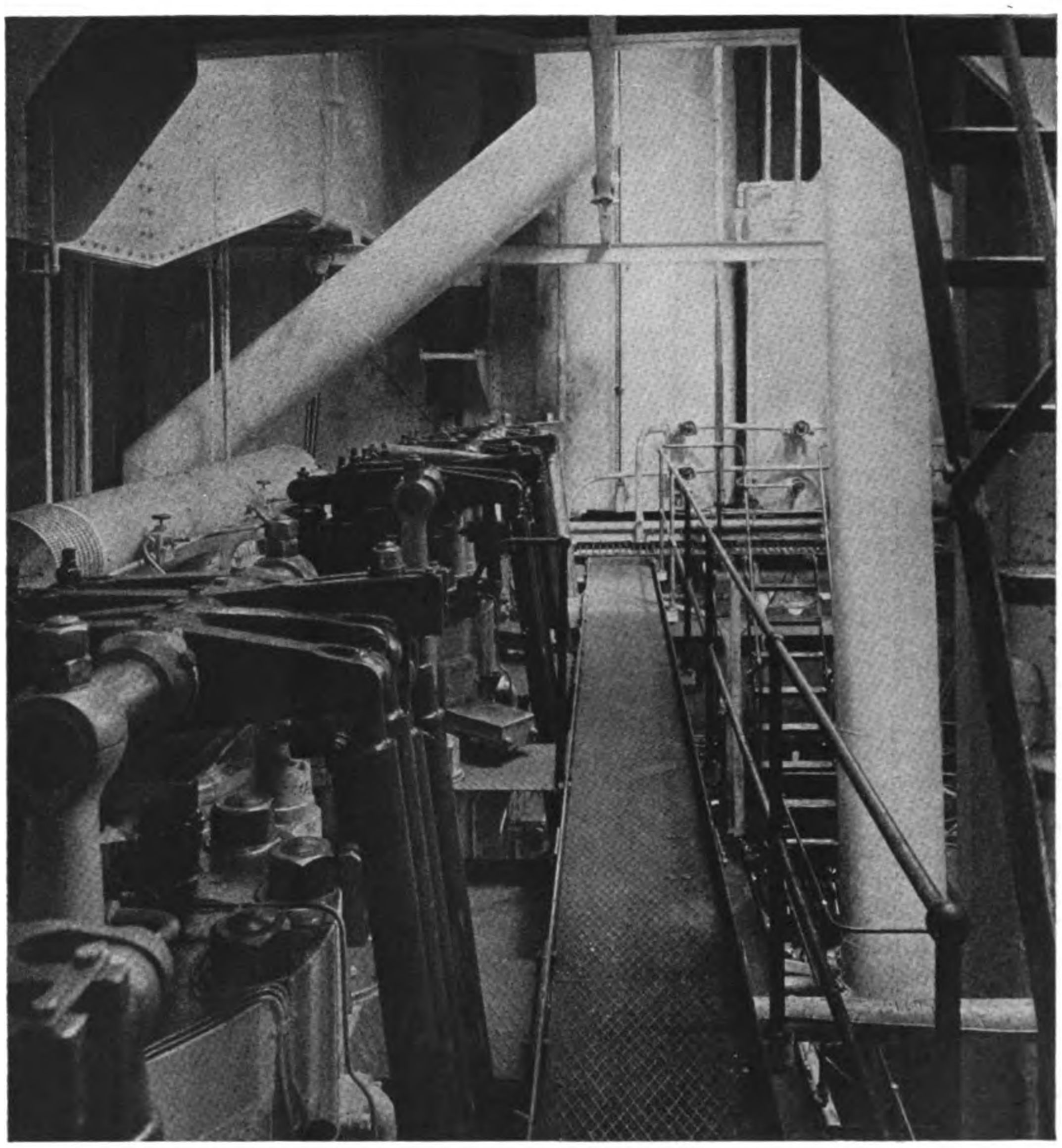
"Referring to Mr. Huskisson, of the Vickers Company, it was not the intention to criticize the Vickers engine in particular, which is known to be of fairly high-compression and is about the only margine engine of the solid-injection type to date that has met with any degree of success for marine purposes. As to the Vickers engine being entirely free from the troubles enumerated, reference is invited to some comments made by Mr. David P. Peel regarding his experience with Vickers submarine-engines, in which he discusses the smoking and knocking in cylinders. This is to be found in the Transactions of the Institute of Marine Engineers, Volume 31, Feb., 1920, Pages 566-572.

"The authors can also speak from experience gained with a four-cylinder 500 h.p. experimental engine of this type and the company with whom they are associated are building very satisfactory solid-injection stationary engines for lower powers.. It should be pointed out that Vickers' experience has been mostly with submarine work and, to the knowledge of the authors, they have only three merchant vessels in operation, which are of comparatively small power. Submarine engines are operated only for short periods at full power and frequently come into special bases prepared for their overhaul, while merchant motorships must operate a long time at full power and away from home without any special attention. We fail to see wherein the accident cited by Mr. Huskisson as occurring to an ex-German vessel has any logical bearing on the matter in the absence of trouble of this kind with standard air-injection engines.

"**Mr. Katzenstein,** representing the Worthington Company, has advocated and defended the proposed Diesel-electric drive on the ground that the higher speed trunk-type engine has been satisfactory as auxiliary engines on B. & W. vessels. It should be noted that the function of auxiliary engines and their operation is entirely different from the main engines as they are very seldom operated at full power, and then only for a specified time, when each in turn is shut down and another started up in its place. It might be stated in this connection that there is a strong tendency at present, on the Continent in particular, to replace the larger sizes of trunk-type engine for land purposes by the crosshead type, due to the generally recognized superiority of the latter, although the weight and cost is higher. For the main drive in a motorship it cannot be too strongly emphasized 'that the best is none too good' for reliability and continuity of operation, which are of the utmost importance. Mr. Katzenstein has also referred to their land engine of the horizontal type, commonly used for driving pumps of oil lines, which are known to be quite heavy and not permissable in a Diesel-electric drive, where the high-speed light-weight engine is a requisite to keeping the total weight of machinery and the space occupied within reasonable bounds.

"**Mr. Anderson,** representing the Parsons' Turbine, states that the motorship cannot make as good an average speed in bad weather as the steamer, when, as a matter of fact, the motorship has a considerable advantage in this respect. The larger diameter single-screw employed with the steamer has a tendency in bad weather to be longer out of the water than the smaller diameter twin-screws of much greater immersion in the motorship and it is apparently only when the screws are in the water that the power can be effectually applied to driving the vessel. Furthermore, there is no throttling of the power in the Diesel-engine, as with the turbines for the steamer, in rough weather.

"This is accounted for in the oil-engine being



M. S. "William Penn." Starboard side of eng ine-room looking forward and showing valve-mechanism of port main engine

able to have all the power instantly cut off when the revolutions exceed a certain determined value, reached when the screws are out of water, and is instantly cut in again when the screws are returned to the water. *The average all-year propulsive efficiency will also be better for the twin-screws as a result of their better immersion under all conditions of draft.* Mr. Anderson considers the oil per s.h.p. of 0.95 lb. all purposes, for the geared-turbine, as used by the authors, can be improved on some 10% with 150° superheat. We are, however, dealing with operating conditions and higher economy implies a very good vacuum for the turbines, and it is a known fact that it is chiefly due to not realizing the designed high vacuum in actual service that accounts for the discrepancies between the trial data and actual performance of turbine vessels. This is particularly noticeable when the vessels are run over tropical routes.

"The efficiency of the steamer also has a tendency to fall-off in service as the boiler heating surfaces deteriorate. The above conditions do not affect the Diesel-engine, which actually improves in economy and which in no way is affected adversely by tropical conditions. Mr. Anderson questions the 0.31 lb. per i.h.p, for main engines, all purposes, used by the authors, and has referred to figures published in "Engineering" of February 15, 1915, which gives a mean of about one-third of a pound of oil per i.h.p. for B. & W. installations up to that date. The explanation for this is that the consumption then published represented the earlier design of B. & W. engines, in which the compressor for the injection-air had its first two-stages driven by separate auxiliary engines, which is a less efficient arrangement than now used, where a three-stage compressor is driven by the main engines alone. Some development in the art is to be expected in that time contributing towards improved economy, as likewise noted in the steam turbine.

"**Mr. Dickerson**, of the General Electric Company, has misinterpreted the meaning of the authors in reference to the importance of electrically driven auxiliaries for motorships, especially in regard to deck machinery. The individual Diesel-drive for the winches, as suggested by Mr. Dickerson, would no doubt be the most efficient arrangement, if such were practicable, as there would be no electrical losses involved. In a motorship, however, the electrical link is necessary to make the power of the auxiliary engines, primarily an accessory to the main engine, available for deck use.

"This does not imply, as we are led to suppose, that the electrical system is accountable for the low port-consumption with a motorship, as by replacing the auxiliary Diesel-sets by a steam-driven set, this oil-consumption in port will be more than trebled. Mr. Dickerson's strong defense of the Diesel-electric drive can readily be understood but the Diesel-electric drive, which is quite a parallel case to the steam-electric, runs contra to the history of all engineering development, which shows that efficiency, simplicity and cost are the deciding factors.

"The electric drive is deficient in each respect and the fact that twelve of the Shipping Board's geared-turbine vessels are being changed over to turbo-electric drive is due to good salesmanship and not good engineering. The first of these installations has been in service since November, 1920, and has steamed approximately 20,000 miles with the electric drive, during which her logs show that she actually consumed 10% more fuel than when equipped with her original geared-turbines, which, by the way, operated with 50° superheat, while the Turbo-electric drive operated under 200° *superheat.*

"**Mr. Warriner's** figures for a motor-driven ore-ship are of particular interest on account of being of two-cycle design, and we presume are based on the "CUBORE" installation. It again furnishes an illustration of the superiority of the four-cycle engine, had such been used in the comparison. By replacing the two-cycle engines with four-cycle of the same cylinder dimensions as the motorship "William Penn," but of eight cylinders each, the normal s.h.p. would be increased 7% and the total weight of machinery, including boiler, reduced at least 100 tons, since the total installation, without boiler, for the four-cycle will be 1,050 tons. The fuel-consumption per day becomes 19 tons instead of 24 tons, with a corresponding increase in cargo-capacity of 140 tons.

"Accordingly, the total increased cargo carrying-capacity will be 240 tons more than with the two-cycle vessel.. Using the same basis of comparison as used by the authors in their comparison, the cost of crew per day for the motorship becomes 12.3, with repairs and provisions same as for the steamer. The cost of fuel is reduced to 6.48, giving a total operating cost per day of 89.56, compared with the 96.38 for the particular two-cycle installation. The four-cycle will be seen to be better than any of the three other drives used by Mr. Warriner in his comparison. It can be safely stated that on the long trade routes the large direct-driven motorship, where proper care is made as to proven types, will show a greater earning-capacity on the investment over all other drives, irrespective of variations in freights-rates and fuel-prices. * * *

Further Discussion and Additional Comments by "Motorship"

Since publication of our last issue, which contained the comments of Mr. Benj. C. Fernald, we have had the opportunity of seeing the balance sheet which he afterwards submitted to the Society. Looking through the same we see he gives the cost of a ship with geared-turbine as $164.50 per deadweight ton, compared with $215.00 per deadweight ton for a single-screw motorship. Also that his turbine-ship is of 8,700 tons d.w. and his motorship of 8,360 tons d.w. These figures, of course, are very misleading as the cost per d.w. ton should not have been taken, but the cost per net cargo-capacity ton, because a vessel is built to carry cargo and relies upon the earnings from that cargo to pay the entire cost. In taking the d.w.c. tonnage fuel, water and stores have to be included, and the steamer, of course, carries three times the amount of fuel that a motorship does, and 150 tons more fresh water.

Furthermore, he quotes the weight of Diesel-engines with auxiliaries as being 795 tons compared with 355 tons and 100 tons additional fresh water for the geared-turbine ship. We fail to see where Mr. Fernald secured his figures for the weight of motorship machinery. We refer Mr. Fernald to the weights of leading American Diesel-engines now under construction or in service given on page 17 of the "Motorship Year Book." If he will select ten of the high-powered crosshead-type engines he will find that the average weight is only 339 pounds per shaft h.p., so that about 400 to 450 pounds per shaft h.p. should include all auxiliaries and would work-out at about 500 tons, and less with some engines. This is some difference from his figure of 795 tons. Our weights include among other engines the Burmeister & Wain, McIntosh & Seymour, Worthington, which are the heaviest marine Diesel-engines on the market.

He also gives the consumption of the motorship fitted with two 1,400 b.h.p. Diesel engines as 13½ tons per 24-hours day. In this connection let us point out that the consumptions of the "William Penn," "Afrika," "Bullaren," "Tisnaren" and similar ships fitted with engines of considerably higher power—namely, 4,500 i.h.p.—are only between 13 and 14 tons. Consequently his figures—starting on a wrong basis—are practically inaccurate throughout. Shipowners should first make certain that consulting-engineers have a thorough knowledge of the motorship and Diesel engine situation before employing them to make comparisons or recommendations.

Robert Warriner stated that it is not his intention to make out a case for the reduction-gear at the expense of the Diesel-engine, because personally he is very much in favor of the Diesel engine, as it means economy of fuel-consumption, and economy is the goal engineers are striving for. He referred to Mr. Fernald having stated that Great Britain and Scandinavia have for the past few years swung over to the motorship almost exclusively, but he considered that this is not an altogether fair remark as far as Great Britain is concerned. Because, on March 31, 1921, there were 794 steamships of 3,500,000 gross tons compared with 66 motorships of 250,000 gross tons under construction. In this connection we may point out to Mr. Warriner that the 794 steamships were practically all ordered before the 66 motorships, and that during the short period in which motorships were ordered at the end of the great ship-construction boom, hardly any orders were placed for steamships. Shipowners change over to motorships in Great Britain came suddenly and immediately followed the slump in orders for steamships. Then came the great slump for ships of all classes. The only recent order in Great Britain has been a 10,300 tons Werkspoor Diesel-engined motorship. Mr. Warriner also referred to the fuel-consumption for a two-cycle Diesel-engine stated by Mr. Smith as 0.515 lb. per shaft h.p, hour as being correct; but that the actual figures used in the calculations was 0.42 lb. for the main engines, the remainder being for auxiliary purposes.

However, there seem to be two methods of calculating shaft h.p. The correct way is to take the power of the main-engines and add to it the power of the auxiliary-engines used at sea, thereby getting the total power. Then take the fuel-consumption for all purposes and work-out the consumption per b.h.p. hour, in accordance with the correct power. Otherwise the figures will be misleading. This will bring the consumption down to about 0.43 lb. per b.h.p. hour for a modern two-cycle engined motorship, and a little lower for a four-cycle engined motorship.

Ernest H. P. Anderson.—This gentleman, who is the representative of the Parsons Marine Steam Turbine Company, stated he does not agree with some of the statements in the opening paragraphs of Messrs. Metten and Shaw's paper, and that it does not seem to him that progress in the construction of large motorship machinery in America warranted shipowners or the Board awarding contracts to engine-builders on a large scale. Also, that the authors to a large extent reviewed the progress made by foreign builders. Here we may say that similar propaganda on the part of the allied steam interests has done much to hamper the adoption of the oil-engine in America.

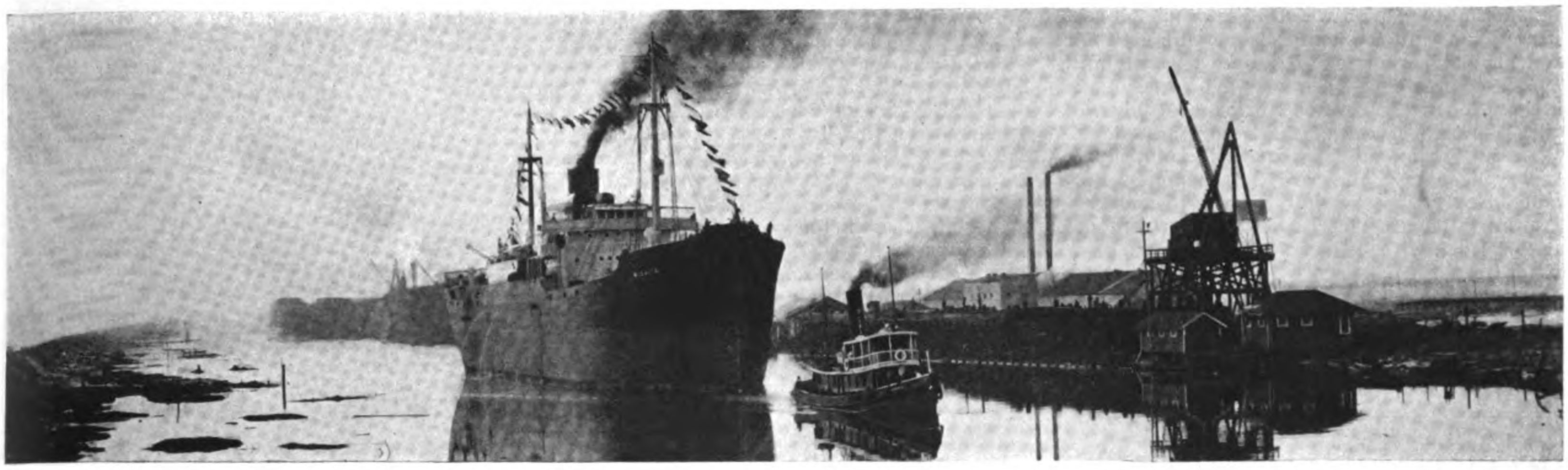
Apparently Mr. Anderson has not taken into consideration the fact that the majority of American shipbuilders have the benefit of a license and experiences of European Diesel-engine builders, together with the assistance of their engineering experts to ensure their successful construction in the United States. He also stated that with bad weather conditions at sea the motorship does not maintain full speed, and that estimates should make allowances for such conditions. We would point out that this condition applies to steam machinery to a greater extent than to Diesel-engines, and, consequently, a motorship will average better speed in bad weather than will the average steamship.

Mr. Anderson also states that Messrs. Metten and Shaw's oil-consumption of 0.310 lb. per i.h.p. hour was based on good trial conditions and that a usual sea performance would be between 0.33 and 0.370 lb. per i.h.p. hour. This statement, we can say, is absolutely incorrect as we can prove by extracts from the log-books of dozens of motorships now in service. We can endorse Messrs. Metten and Shaw's figure of 0.310 lb.

Theo. Lucas in his reply dwelled on the discussion of the possibilities of the development of the two-cycle engine and its development in larger sizes and among other things suggested fitting a forged-steel liner in the cylinder of the two-cycle engines with ports cut directly into the steel, which would allow reduction in the thickness of the liner, a more effective cooling and the avoidance of cylinder cracks. He furthermore stated that one could concur heartily with the authors about the conversion of old ships into long-stroke Diesel-driven units, which will probably be found the best solution of the shipping tangle.

Hubert C. Verhey endorsed Messrs. Metten and Shaw's figures from actual and practical personal experience secured during the round trip to the Orient on board the motorship "George Washington." Nevertheless, he considered the splendid performance of the four-cycle engine does not picture the actual situation from a heavy-oil engineering standpoint because of the limit in power, and he advocates resorting to double-acting two-cycle engines.

M. L. Katzenstein considers that the solution of the problem of the engines in many of the present Shipping Board vessels will be brought about by the use of moderately high-speed Diesel-engines transmitting their power through electricity or other means, to the existing single-screw shaft. That disadvantage of high-speed engines are no doubt justified, but when applied to moderate speed engines will not hold in the face of current experiences. As a support to this theory he referred to the reliability of the moderate-speed auxiliary-engine installed in the engine-room of the "Selandia," placed in service February, 1912,



Yard of the Doullut & Williams Shipbuilding Co., Inc., the only industry now in operation on the Inner Harbor and Navigation Canal at New Orleans. The ship shown is a 9,600 tons steel vessel built for the Shipping Board.

New Orleans Canal Completed This Year

Opening of a New $25,000,000 Inland Waterway Will Benefit Commercial Motorship Traffic

MOTOR-BOAT owners and operators throughout the South, including those interested in the 10,000 or more commercial motor craft in service along the Gulf of Mexico coast of the United States, expect great benefits from the use of the New Orleans Inner Harbor and Navigation Canal, now being completed at a cost of approximately $25,000,000. This canal was dedicated, it will be remembered, but will not be in actual operation until after the period of high water in the Mississippi river at the end of this summer, connects this big waterway with Lake Pontchartrain, running directly across the lower part of the city of New Orleans, with a length of five and one-half miles between the huge concrete lock at the river end and the tide level opening into the lake.

Whatever the value of this canal to deep-sea traffic and to general world commerce, there can be no question of its worth to small-boat traffic, and to coasting steamers, motor-freighters, schooners and barges. In the first place, it forms a most necessary and valuable link in the Intercoastal Canal, or will form such a link should a delaying government ever complete that important waterway. Through Lake Borgne and Ponchartrain, the new canal connects the Gulf of Mexico, Mississippi Sound and all the waterways east of the mouth of the Mississippi with that stream, thus giving close connection between every waterway in the Mississippi Valley with all the ports eastward to the western coast of Florida. It also cuts off about 40 miles of the distance from New Orleans to the Gulf of Mexico, for shallow-draft boats, which can use Lake Pontchartrain and Lake Sorgne and Mississippi Sound, all of which are protected waterways.

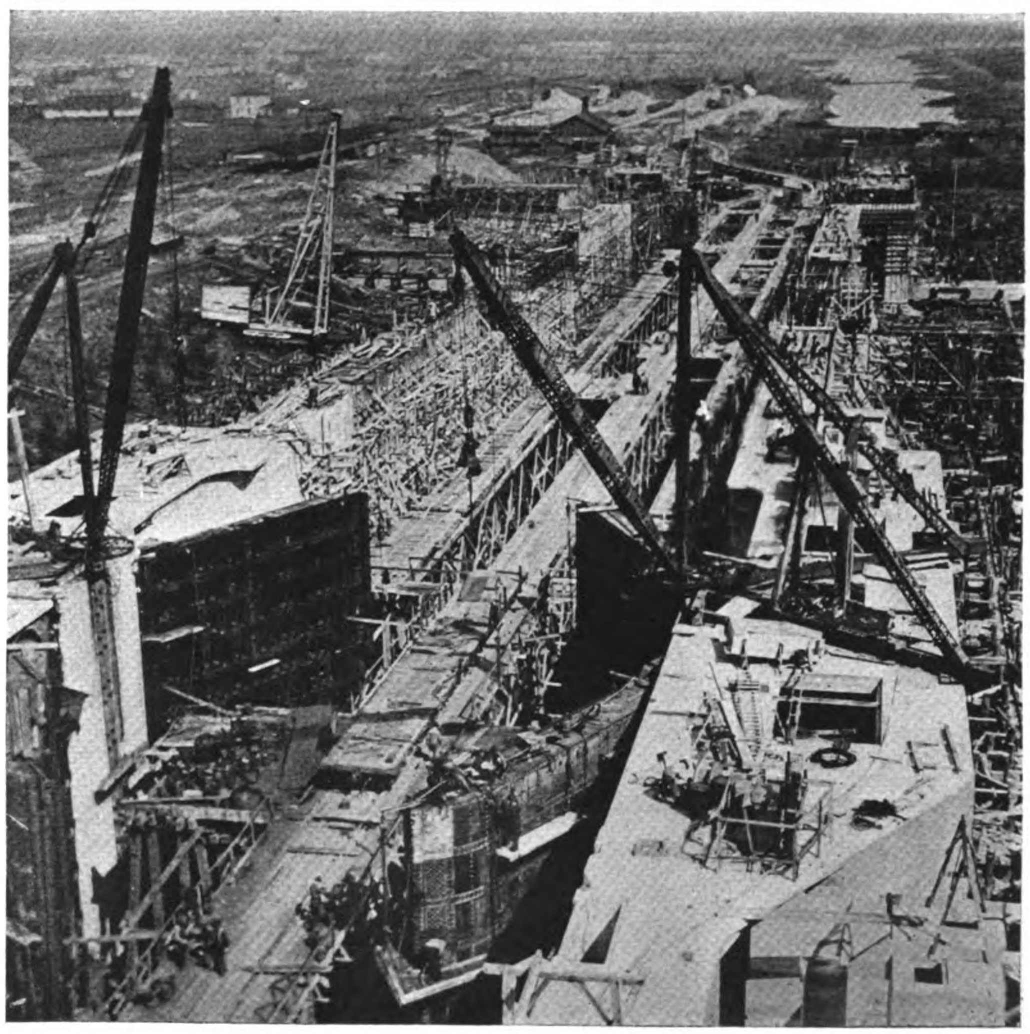
Likewise this new canal connects all these eastern waterways with the 5,000 or more miles of navigable inland streams, bays, bayous and lakes in western Louisiana, clear to the Texas line. Many of these waterways are navigable into other states to the north and west, but motor-freight and passenger carriers from this vast area always heretofore have been compelled to pass down and out of the Mississippi river to reach Mississippi Sound and the gulf coast ports of Louisiana, Mississippi, Alabama and Florida, or to pass through the Lake Borgne Canal into Lake Gorgne, and thus out to the Gulf—both circuitous and costly courses.

The Warrior river government barge-service, which annually handles hundreds of thousands of dollars worth of coal into New Orleans from the Alabama fields, has been compelled to come into New Orleans harbor at Violet, 12 miles below the city, and from there fight the heavy and treacherous current of the mighty Mississippi up to the port. Through the help of the new canal these barges now can pass more quickly, more safely and with less expenditure of fuel, through Lakes Borgne and Pontchartrain and directly into the center of the port of New Orleans.

To the fishing fleets alone, operating in the shrimp, oyster and salt-water fish industries of the Gulf coast, this canal furnishes a direct and protected gateway into New Orleans. The Crescent City, because of its distance from the fishing grounds, has lost virtually all the shrimp and oyster packing plants to the coastal towns of Mississippi, such as Biloxi, Gulfport and Pascagoula. The new cut-off furnished by the Inner Harbor and Navigation Canal, reducing the distance from the gulf approximately 40 miles, should bring back some of these industries, which are tremendously valuable, to New Orleans. This canal also opens the port of New Orleans to all the heavy schooner, barge and motor-freighter traffic of the northern and western shores of Lake Pontchartrain and Lake Maurepas and their tributary streams, as well as all the shores of Lake Borgne, its fisheries and the rivers which empty into it. Indeed, it is doubtful if ever a step has been taken which means so much to the motorboat industry.

One of the main drawbacks to the development of the American Merchant Marine today is the reticence of American capital toward investment in fleets; one of the main drawbacks to the development of the foreign trade of New Orleans is the failure of the Mississippi Valley and New Orleans interests to own their own fleets of freighters, but no such handicap lays on the "mosquito fleets" of motor-craft along the Gulf Coast, with the result that their development has been the greatest the writer has ever seen or of which he has ever read, along similar lines in any part of the world.

Of course, it is obviously impossible for these motor-fleets to pay the annual interest of more than $1,000,000 on the $25,000,000 cost of the New Orleans Canal, by their use of that waterway, so it must look to a deep-sea traffic of large merchant-ships to pay that interest as well as to sup-



Looking along the lock of the Inner Harbor and Navigation Canal at New Orleans from the Mississippi River and back northward toward Lake Pontchartrain. The completed part of the canal can be seen in the background

ply a sinking fund with which to take up the cost of the canal, but the motor-fleets will do their share, and, for a number of years, at least until a 35-foot channel has been dredged across Lake Pontchartrain to the Gulf of Mexico, probably will furnish the larger part of the traffic through the new Inner Harbor and Navigation Canal.

As has been said, the New Orleans Inner Harbor and Navigation Canal is about five and one-half miles in length. The Lake Pontchartrain end is at tide level, without lock; the Mississippi river end passes through a large lock, second in size only to the Panama Canal locks in the New World, out into the big stream. The canal proper is 300 feet in width at the top, 150 feet wide at the bottom, and 30 feet in depth. It contains a large turning basin, and both banks furnish eleven miles of wide sites for ship and boatyards, warehouses, manufacturing plants and other similar industries.

The dedication of the canal is scheduled coincident with the annual convention of the Mississippi Valley Association, which will bring to New Orleans delegates from 26 states, representing waterways, shipping, manufacturing, exporting and other commercial interests. Most of the inland waterways men are also interested in the development of motor boat traffic on the inland waterways of the country, and plans are on foot for a tour of inspection of the canals—of which this is the sixth—leading into and out of New Orleans, and now in constant and heavy use by the motor fleets.

The lock is located approximately 2,000 feet from the Mississippi river, inside the main levees, which will be cut in September or October, after the period of high-water has passed, and the waters of the big stream admitted to the lock. The lock is connected with the river by a channel 300 feet wide on the surface, 150 feet wide at the bottom and having a depth of 30 feet at low water in the Gulf of Mexico. The lock masonry has a length of 1,050 feet over all, with a width, from outside to outside of 160 feet. The usable length of the lock is 600 feet and its clear width 75 feet. It will handle vessels up to about 20,000 tons. The walls of the lock rise 68 feet above the floor, and there is a depth of 30 feet of water over the sills. The steel gates to the lock weigh 400 tons, and the machinery for their handling, all electrical, has been installed.

Diesel-Engined Coastwise Vessel With Reversing Rudders

Since the bygone days of Columbus, and the Armada, history has seldom attributed to Spain the lead in any direction of national enterprise, including even navigation, in which the Spanish were at one time Europe's keen rivals. It is noteworthy, therefore, that one of the newest inventions for navigation, namely a reversing rudder, has been adopted by Spanish owners in one of their coasting motor-vessels, the "Alca," which at the present moment is one of the largest vessels thus equipped actually in service.

Some particulars of the vessel will no doubt prove interesting to our readers, particularly those concerned with the motor-driven vessels. The "Alca" is a steel vessel of 500 tons displacement, and 300 tons dead-weight carrying capacity, engaged in carrying coal and general cargo along the Atlantic coast of Spain. Her dimensions are: Length 140 ft., beam 22 ft. 3 in., and depth 10 ft. moulded; her loaded draft being 8 ft. 3 in. Originally built as a sailing vessel she has now been re-rigged and equipped with a 150 b.h.p. Sulzer stationary type Diesel engine, which turns a propeller of 4 ft. diameter. The engine has no reversing or clutch devices of any kind, all stopping, running astern, and maneouvering of the vessel being obtained solely with the reversing rudder, which is of the type designed and made by the Kitchen Reversing Rudder Co. of Liverpool, Eng., and also constructed by the McNab Co. of Bridgeport, Conn.

To install this rudder the original rudder-post was removed by cutting through at the top and bottom of the propeller aperture; and an extension to the stern-foot to take the bottom pintle was added and securely rivetted to the keel; at the top of the rudder a strong gudgeon or bearing was rivetted to the ship. The rudder blades are of mild steel-plate ½ in. thick; the inside dimensions of the blades are 64 in. by 58 in., the major axis being horizontal.

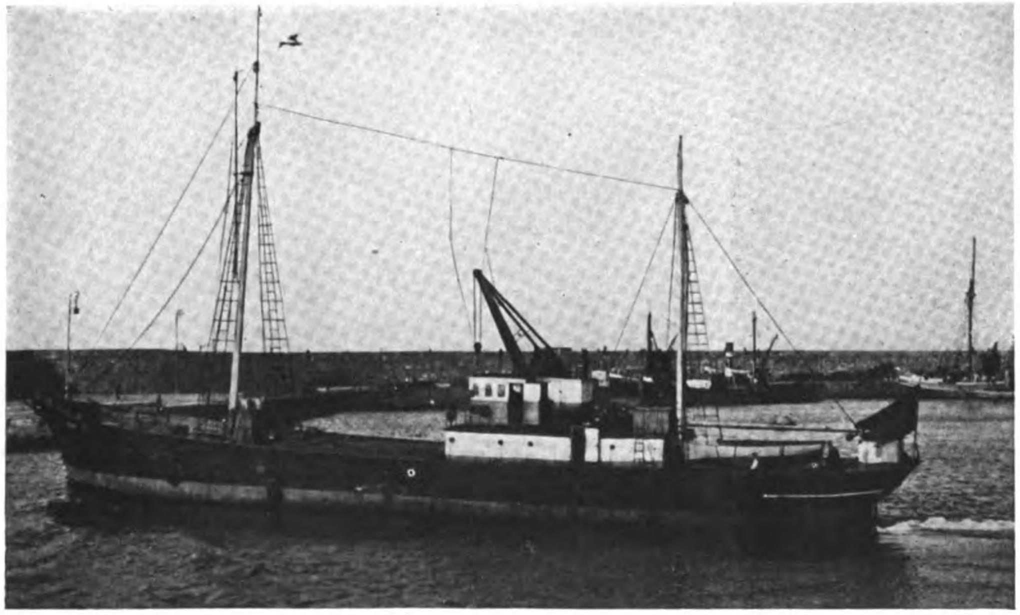
The speed and reverse control-wheel for operating the rudder is mounted in the wheel-house on the starboard side of the steering wheel. The motion from this control-wheel is conveyed to the rudder-head operating-gear by means of steel chains over guide sheaves and rollers and it is this wheel which regulates the opening and closing of the rudder blades, and of course all their intermediate positions.

Helm is controlled in exactly the same manner as with the ordinary type of rudder, the opening and closing of the rudder blades in no way interferes with their helm-carrying powers, as either of these operations can be carried out independently of the other as they are not inter-connected.

Depicting Kitchen reversing-rudder on stern of Diesel coaster "Alca"

The vessel attains a sea-speed under power of 6¼ knots and the results of manoeuvring trials are interesting. The astern speed was 2¼ knots. The time taken to bring the vessel from full-speed ahead to dead-stop was 34 seconds and the distance travelled was 200 ft. The diameter of her turning circle at full-speed ahead was 140 ft. The time taken to spin about an axis amidships, as if on a pivot through a half-circle, occupied 1 minute 25 seconds.

The rudder control is most efficient and practically instantaneous in effect and permitted the maneuvering and working of the vessel in and about the congested harbors and docks with the greatest ease and reliability. The Gijon representative of the Spanish equivalent to our Steamboat Inspection Service expressed complete satisfaction with the installation and the trial results, upon which he has to submit a report to headquarters at Madrid. The vessel has now been in operation for six months with every success and the rudder device has worked excellently.



The Spanish Sulzer-Diesel-engined coastwise motorship "Alca" propelled by a Sulzer Diesel-engine

FURTHER VOYAGES OF THE DIESEL-TANKER "MEXICO"

On pages 39-40 of our January, 1921, issue details were given of three round-voyages from America to Denmark and back of the new 4,450 tons d.w.c. 1,100 shaft h.p. Holeby Diesel-engined motor-tanker "Mexico." Since then we have received information regarding an additional round-voyage from her master, Capt. E. H. Jorgensen. She left New York on the 10th of December, 1920, at 4:50 p. m. with a cargo of petroleum and naphtha in bulk. Her capacity etc. was as follows:

New York-Copenhagen	Dec. 10th-Dec. 29, 1920
Total amount net-cargo	3,995 tons
Fuel-oil carried	266 tons
Dead-weight-capacity	4,300 tons (about)
Fuel consumed by main engines	100 tons
Fuel consumed by donkey-boiler	13 tons
Distance covered	3,706 naut. miles
Time at sea	459 hrs.
Time pumping cargo	30½ hrs.
Average speed	8.1 knots.

She arrived at Copenhagen Dec. 29th at 3 p. m. having covered the trip of 3,706 nautical-miles in 459 hours, or at an average speed of 8.1 knots which is very good for a vessel of her tonnage and low power. Best test run was 221 miles. She consumed 113 tons of fuel-oil, of which 13 tons was used for steam heating.

Copenhagen-New York	Feb. 7th-Feb. 21, 1921.
Total amount of cargo	In Water Ballast
Fuel-consumed by main engines	105 tons
Fuel-consumed by donkey-boiler	14 tons
Distance covered	3,652 naut. miles
Time at sea	490 hrs.
Best day's run	245 naut. miles

She left Copenhagen again on Feb. 7th at 2:35 p. m. in water ballast and arrived at New York, Feb. 27th at 6:20 p. m.—the voyage having lasted 490 hours, a distance of 3,652 miles. Thus she covered an average speed of 7.5 knots. Her best day's run was 245 miles. On this trip she consumed 119 tons, of which 14 tons was used for steam heating. It is well to draw attention to the fact that on the return voyage in ballast the main engines consumed 5 tons more than they burned on the outward voyage fully loaded, but the distance log was 54 miles greater. Frequently tankers make better speed loaded than when light.

Interesting Notes and News from Everywhere

NEW SURFACE-IGNITION OIL-ENGINES

A new marine oil-engine of the surface-ignition type is being developed by Cooper & Greig, Britannia Works, Dundee, Scotland.

DIESEL TANKERS FOR HUGO STINNES

"Oberschlesien" and "Ostpreussen" are the names of the two Diesel-driven tankers building at Krupps of Kiel to the order of Hugo Stinnes.

FRENCH SHIPBUILDER'S BIG PROFITS

Net profits of two and a quarter million francs were made during 1920 by the Chantiers et Ateliers St. Nazaire, one of the Werkspoor Diesel engine licensees in France.

LAUNCH OF MOTORSHIP "SAN ANDRES"

At J. & K. Smit's shipyard, Krimpen, Holland, the new 3,000 tons d.w.c. motorship "San Andres" was launched during July to the order of the Otto Thoresen Line of Christiania, Norway. She is propelled by a 1,250 i.h.p. Werkspoor four-cycle Diesel-engine.

NEW MOTORSHIP OF 5,200 SHAFT H. P.

Twin 2,600 shaft h.p. Sulzer two-cycle Diesel-engines are being installed in the 12,000 tons d.w.c. motorship now building for the Hamburg-South America Line at the Reiherstieg shipyard, Hamburg, where the Standard Oil Co.'s big single-screw Reiherstieg-Carels, Diesel-engined tanker "Wotan" was built.

MOTORSHIP RESCUES MOTORSHIP'S CREW

Recently, as reported, the American wooden motorship, "Balcatta," became waterlogged. Her crew was picked-up by the British steel motorship "La Paz" (illustrated in November, 1920). Later the crew returned to the "Balcatta," which was towed to Talechuano and repaired.

DIESEL-ENGINED AUXILIARY "BRAZIL."

The Lloyd Nacional, of Rio de Janeiro, have had their motor auxiliary schooner "Brazil" in service for some considerable time. This vessel is of 1,598 tons gross and is propelled by a four-cylinder 13⅜ x 21¼ Sulzer two-cycle Diesel engine. Her length is 22 ft. by 43 ft. breadth and 23 ft. 3 in. depth. She was built by the Empreza Brazileira de Const. Navals, of Rio de Janeiro.

DIESEL-DRIVEN SUBMARINE-CHASERS FOR JAPAN

Orders for Diesel oil-engines for submarine patrol-vessels to the value of 57 million francs have been placed by the Japanese Navy Department with Sulzer Freres of Winterthur, who are also building some 4,000 shaft h.p. two-cycle type Diesel-engines for big Japanese submarine-cruisers, as previously announced in our pages.

NEW MOTORSHIP SERVICE VIA PANAMA CANAL

Supplementing three coal-burning steamers, the Holland-America Line and the Royal Mail Steam Packet Line are jointly placing six 15,000 tons d.w. 13-knot motorships in service between the North American and European ports. Each vessel will have refrigerating space for 1,500 tons, for apples, oranges and other refrigerated products. The vessels are now completing.

NEW SOUTH AMERICAN SERVICE

For some time past the motorship "Oregon" has been laid-up together with large steamers, because of no available cargo in the Danish-American tramp service. But her owner, the United Shipping Co. of Copenhagen, have now inaugurated a Denmark-South American service with this vessel and her sister Diesel-ship "California." A third B. & W. engined motorship for these owners is building at the Nakskov plant in Denmark.

DICKIE'S VOYAGE ON A MOTORSHIP

A trip from San Francisco to Dublin, Ireland, on the Johnson Line motorship "Pacific" was recently made by R. Z. Dickie, a well-known Pacific Coast naval-architect and marine-engineer. Mr. Dickie states that the first fact which impressed itself strongly upon him was the continuous and entirely reliable operation of the Diesel-engines, with apparently even less attention required than had been his experience with reciprocating steam-engines. He mentions that in a period of seven months shop-repair bills amounted to less than $700. One trip of 52 days continuously was run in Texas paraffin-base oil, and one of 32 days non-stop on California asphalt-base oil.

FOURTH ORE-CARRYING MOTORSHIP

The keel of the fourth Diesel-driven motorship of a fleet of sixteen building for the Rederi. Grangesberg-Oxelosund at the Götaverken, Göteborg, was recently laid. The m. s. "Strassa," the first of the fleet will be ready for trial very shortly.

LAUNCH OF MOTORSHIP "ADRIA"

On July 16th the Swedish Lloyd's new twin-screw cargo motorship "Adria" was launched at the Götaverken, Göteborg, Sweden. This vessel has the following dimensions.

Deadweight Capacity (about)	8,200 tons
Power	2,800 i.h.p.
Length O. A.	396 ft.
Length B. P.	381 ft., 8 in.
Breadth M. D.	53 ft., 9 in.
Depth to S. D.	33 ft., 4½ in.
Draught (Loaded)	24 ft., 11 in.
Bunker Capacity	1,150 tons
Passenger Capacity	12 first-class
Loaded Speed	11 Knots
Aux. & Deck Machinery	Electric

Two Götaverken B. & W. type Diesel oil-engines of 1,400 i.h.p. are installed. For heating the ship there is a small oil-fired donkey-boiler that can furnish steam to an emergency air-compressor. The steering-gear is of the electric-hydraulic type. A Clarke, Chapman electric-windlass, and ten 5-tons electric-winches made by the General Electric Co. (A. S. E. A.) in Vasteras, Sweden, are installed. A "wireless" installation is carried.

Launch of the motorship "Adria" at the Gotaverken yard to the order of the Swedish Lloyd

FOAMITE FIRE FOAM DEMONSTRATION

An important demonstration of the apparatus of Foamite Fire Foam in connection with oil fires was given before the Imperial Japanese Naval Commission. The final demonstration consisted of a tank 50 ft. long, 15 ft. wide and 12 in. deep filled with fuel-oil primed with gasolene. The oil was ignited and allowed to burn for five minutes, the flame having reached the height of 100 ft. In one minute and 20 seconds from giving the signal the fire was completely extinguished. A number of important firms also sent witnesses, including the Mitsui Shipbuilding Co., New York Shipbuilding Corp., Wm. Cramp & Sons Shipbuilding Co., The Sun Co., and the Philadelphia Navy Yard. The demonstration was carried-out by Chas. Cory & Sons, Inc., of New York, marine distributors and installation engineers in U. S. A.

MAIDEN VOYAGE OF THE "WILLIAM PENN"

On her maiden voyage, the Shipping Board's new motorship "William Penn" will be operated by the Barber Steamship Company, instead of by the United American Lines. She has loaded 75,000 cases of oil and general cargo, and the first round trip to the Far East via the Canal is expected to last six months. Full details of this vessel appeared in the June issue of "Motorship."

MOTORSHIP "KENNECOTT" RETURNING TO NEW YORK

Recently the motorship "Kennecott" left San Francisco for New York via the Canal. Among her cargo is 300 tons of raisins shipped by the Associated Raisin Growers Association of Fresno, Cal. The raisins are being placed on the motorship, it is said, on the theory that this type of vessel is superior to steamships for the transportation of fruit, due to the fact that shrinkage is eliminated on account of there being no internal heat, thereby diminishing the chances of damage from condensation of moisture in the holds.

THE HANSA CO.'S MOTORSHIP

Regarding the 9,000 tons d.w.c. motorship with German constructed Diesel-engines now building for the Hansa Steamship Co. of Bremen, Germany, it is of interest to confirm our previous announcement that another motorship is being constructed for this big company at the Howaldswerke, Kiel. As the same yard is also building two 9,000 tons steamers with turbine and reciprocating steam-machinery respectively, some very interesting comparisons should soon be available to German shipowners. The second motorship is having twin 1,600 shaft h.p. Sulzer two-cycle Diesel-engines.

MARINE OIL-ENGINE BUILDERS OF THE WORLD

In the list of Diesel and surface-ignition marine-oil-engines of the world, published in the "Motorship Year Book" the following concerns were omitted.

Diesel Engine

Lombard Governor Co., Ashland, Mass., U. S. A.	Lombard-McCarty	4-cycle

Surface-Ignition Engine

Ing. Oscar Amrein, Via Solferino 24, Milan, Italy	Grade	2-cycle
Cooper & Greig, Britannia Works, Dundee, Scotland	Cooper & Greig	2-cycle

Also the builders of the G. M. A. Diesel engine were given as the G. M. A. Schiffsmaschinen, instead of the Waggon-und Maschinenbau Aktiengesellschaft Gorlitz, of Gorlitz, Germany.

We will be glad if our readers will furnish us with additional names of marine oil-engine builders not included in the list in the "Year Book."

ANOTHER MOTORSHIP ORDERED IN ENGLAND

In these days of the worst shipbuilding slump ever known in Great Britain, it is interesting to record the ordering of a new motorship in that country. A twin-screw 2,400 i.h.p. Werkspoor-Diesel-engines vessel of 10,350 tons has been ordered by Hunting & Sons, Milburn House, Newcastle-on-Tyne, England, from the Tyne Iron Shipbuilding Co. Hitherto they have exclusively operated steam-tankers. The two 1,200 to 1,400 i.h.p. Werkspoor Diesel-engines will be built under license by the North Eastern Marine Engineering Co., Wallsend-on-Tyne. The vessel will have the following dimensions:

Length	365 ft.
Breadth	51 ft.
Draught	25 ft.
Power	2,400-2,800 i.h.p.
Speed (loaded)	10½ knots

It is expected that she will be ready for service in about a year.

BIG CANAL COMPANY

During June the New York Canal & Great Lakes Corporation was registered under the laws of Delaware. The capital is $5,000,000.

TEN THOUSAND HORSE-POWER DIESEL ENGINES

Sulzer-Frères are ready to construct marine-type Diesel oil-engines of 10,000 shaft h.p. for passenger-liners.

THREE MOTORSHIPS FOR WILHELM WILHELMSEN

Three motorships are under construction for Wilhelm Wilhelmsen of Tonsberg, Norway at the Burmeister & Wain Yard, Copenhagen.

MOTORSHIP "ATHENE" CHANGED TO "ESTRELLA"

The recently-built Werkspoor Diesel-engined motorship "Athene" has been purchased by Det Bergenska Dampskibsselskab of Bergen, Norway, and her name changed to "Estrella."

NEW TRANS-OCEAN MOTORSHIP SERVICE

A new service of motorships between Great Britain, Europe and west and South west Africa will shortly be inaugurated by Atlantic Motorships Ltd., Norwich House, Southampton Street, High Holborn, London, W. C. 1.

MOTOR COASTER "MACADAM" LAUNCHED

J. Samuel White & Co., East Cowes, Isle of Wight, England, recently launched the 350 tons d.w. coastwise motorship "Macadam," built for The Road Maintenance Co., Ltd. Propelling power is furnished by a 220 b.h.p. Vickers-Petters surface-ignition oil-engine running at 275 R.P.M.

DANISH PRINCE NOW MOTORSHIP CAPTAIN

Prince Axel, nephew of the King of Denmark, has taken a position as Captain of the East Asiatic Co.'s motorship "Asia." It may be remembered that the King of Denmark recently used the 7,500 tons luxurious passenger-cargo motorship "Fionia" as a yacht on his recent tour.

JOHN BROWN'S YARD LAUNCHES 14,000 TONS MOTORSHIP "LOCH KATRINE"

During the first week in August the 14,000 tons d.w.c. motorship "Loch Katrine" was launched by John Brown & Co., of Clydebank, to the order of the Royal Mail Steam Packet Co., for fruit, passenger and general carrying service from the Pacific Coast to England. She is being fitted with twin Harland & Wolff B. & W. Diesel-engines aggregating 6,600 i.h.p. Speed 12½ knots.

"CUBORE" IN OPERATION AGAIN

Recently the motorship "Cubore" of the Ore Steamship Company sailed from Baltimore for Cuba to load 10,000 tons of iron-ore. She has been laid-up at Sparrows Point for alterations since last December. This vessel is powered with a 3,500 i.h.p. six-cylinder two-cycle Bethlehem-West Diesel engine.

MOTORSHIPS IN THE FAR EAST

Among motor-vessels in service in the Far East is the "Aria," 250 tons d.w., built in Burma in 1918. She is propelled by a 100 b.h.p. Avance surface-ignition oil-engine. The largest motor-vessel constructed last year in the Far East was the "Kungram," 1,400 tons d.w.c., built in Rangoon. She is propelled by a 400 b.h.p. Avance surface-ignition oil-engine.

THE MOTORSHIP "COMETA"

In our last issue we illustrated the launch of the new Johnson Line motorship "Cometa" at the Burmeister & Wain plant in Copenhagen. She is the ninth standard motorship built at this yard for the same owners and a tenth Diesel ship is also on the ways. "Cometa," has the following dimensions:

Deadweight capacity	6,500 tons
Length	367 ft.
Breadth	51 ft., 3 in.
Depth	34 ft.
Power	2,600 i.h.p.

Some motorships for the Johnson Line have also been built at the Götaverken, Göteborg, including the "Buenos Aires" and the "Canada."

SAYS THE BRITISH PETROLEUM CO.

"The present acute condition of industry and transport is incidentally the golden opportunity for the motor-driven ship to prove its superiority.

BURMEISTER & WAIN SOLID-INJECTION ENIGNE

Diesel-engines of the solid-injection type are being built for stationary purposes by Burmeister & Wain of Copenhagen. Their marine engines are of the air-injection type.

OUR REGISTRY OF MOTORSHIP ENGINEERS

J. A. Finn was five years with the U. S. Navy Department operating submarine Diesel-engines, and for six months was trial engineer for the Electric Boat Co. Holds 500 tons motorship license.

George G. Carr, P. O. Box 350, New London, Conn., has unlimited license for motorships, was Chief-Engineer of American motorship. About 10 years' experience in machine-shop; has been foreman of installation work on engines and ships also erecting and testing Diesel engines.

BOLINDERS CO. OPEN NEW ENGLAND BRANCH

Bolinders Company, of New York, announce the opening of a New England branch at 411 Exchange Building, 53 State Street, Boston, Mass., for the purpose of building oil-engines for marine and stationary purposes.

MOTORSHIP FOR QUARTO COMPANY

A 500 tons d.w. motorship is to be built for the Quarto Steamship Co. of Copenhagen, in which Polar Diesel-engines are to be installed. The vessel is to incorporate all the benefits created from the experiences with their motorship "Lidsoe" in which a Tuxham surface-ignition oil-engine is fitted.

OIL-ENGINES IN CANADIAN FISHING-VESSELS

Very few Canadian craft have been heavy-oil engine powered, so it is of interest to record that a 35 b.h.p. Kahlenburg surface-ignition oil-engine is being installed in a new fishing-boat building for the British Columbia Canners Ltd. Another Kahlenburg oil-engine of the same power is also being fitted in a Canadian fishing-boat.

MOTOR TUG CROSSED ATLANTIC

During the war the British Admiralty brought the 118-ft. motor tug "Dreadful" across the Atlantic from Vancouver to England, via the canal, a total distance of 15,000 miles. This vessel is propelled by Bolinder oil-engines, and was originally built for the Canadian Western Lumber Co. of Vancouver. She is now operated by a large towing company on the river Thames.

MOTORSHIPS FOR RED SEA SERVICE.

Two 200 b.h.p. Beardmore surface-ignition oil-engined coastwise motorships of about 550 tons d.w.c. have been built at the London & Montrose Shipbuilding & Repairing Yard, Montrose, Scotland, for Mr. A. Besse of Aden, Arabia. They will be used in Red Sea trading. Their dimensions are as follows:—

Gross tonnage	386 tons
Length	132 feet
Breadth	25 feet
Power	200
Speed	9 knots

The first of these vessels has been named "El Ghazi" and was recently placed in service.

HAMMERHEAD CRANE INSTALLED IN NEW YORK SHIPYARD

A 200-ton hammerhead crane with an 85-ft. radius and a clear lift of 180 ft. has been installed at the New York Shipbuilding Corp.'s yard at Camden by Wellman-Seaver-Morgan Co. of Cleveland.

B. S. N. C. MOTORSHIPS

In a recent issue we gave complete details of the motorship "Domala," owned by the British Steam Navigation Company. Her sister motorships will be named "Durenda" and "Dumana." The former is being built by R. Duncan & Co., Glasgow, while the second is being constructed by Barclay, Curle & Co.

LUBRICATION OF OIL-ENGINES

An article on the lubrication of various kinds of engines and air-compressors appears in a recent issue of the "Compass" published by the Vacuum Oil Company. A section deals with Diesel-engines and another with surface-ignition oil-engines.

ANOTHER BRAZILIAN AUXILIARY

In the 1,598 tons-gross wooden auxiliary-schooner "Italia," built last year for the Lloyd Nacional of Rio de Janeiro, Brazil, by the Empreza de Constr. Nav. of the same city, a four-cylinder two-cycle 13⅝ in. by 21¼ in., 410 b.h.p. Sulzer-Diesel engine has been installed. Her length is 222 ft. by 43 ft. breadth, and 23 ft. 3 in. draught.

CAMMELLAIRD-FULLAGAR LICENSES

The following firms have acquired licenses to construct Cammellaird Fullagar engines:

John Brown & Co. Ltd., Clydebank, Scotland; David Rowan & Co. Ltd., Glasgow, Scotland; Dunsmuir & Jackson Ltd., Glasgow, Scotland; Cammell, Laird & Co. Ltd., Birkenhead, England; Palmers Shipbuilding & Engineering Co. Ltd., Jarrow-on-Tyne, England; Ateliers et Chantiers de Bretagne, Prairie au Du., Nantes, France. As indicated elsewhere it is possible that the Bethlehem Shipbuilding Corp. may have acquired a license.

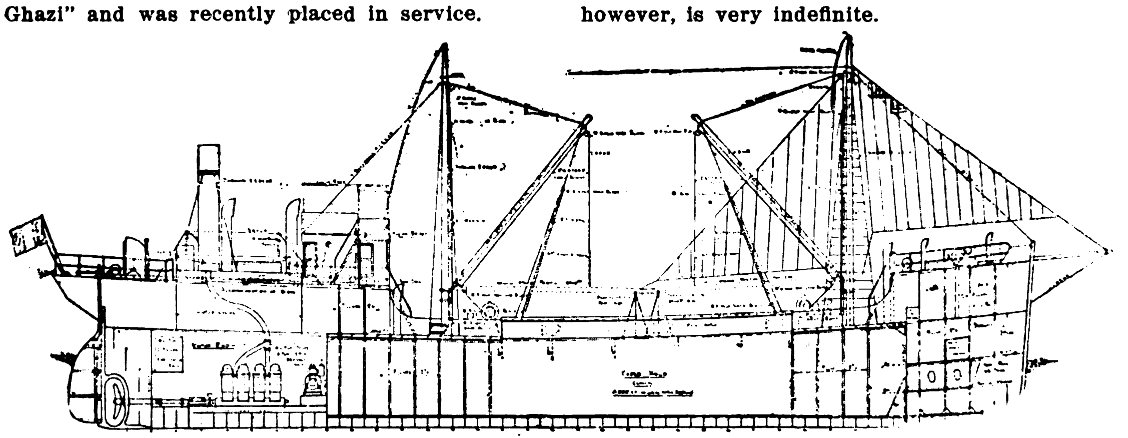
OCEAN MOTORSHIP COMPANY ORGANIZED AT SAN FRANCISCO

May Change from Wooden to Steel Hulls

W. L. Comyn and Co. recently announced that with the organization of the Ocean Motorship Company the affairs of the Pacific Motorship Company were finally adjusted as indicated last month. The new company has bought out all the claims of the Australian Government against the Pacific Motorship Company arising out of the original contract under which the Commonwealth was to purchase the seven motorships of the Pacific Motorship Company for about $1,250,000.

Officers of the new corporation, which will handle the outstanding obligations of the Pacific Motorship Company and operate the fleet on the Pacific Coast, are W. E. Gerber, Jr., President; R. M. Roberg, Vice-President; and C. N. Howard, Secretary. One of the fleet, a motorship of the type called "B" boats, which are of 4,300 tons deadweight, namely, the "Boobyala," recently arrived at Tacoma. Another, the "Culburra," of the "C" type, which are 3,000 tons deadweight, is now sailing from South America for Northwestern points.

Tentative plans of the company call for the removal of the McIntosh & Seymour Diesel machinery from the wooden "B" boats and its installation in steel hulls. When this will be done, however, is very indefinite.



One of two single-screw Beardmore oil-engined coastwise motor-vessels built at Montrose, Scotland, for Red Sea, service.

ARMSTRONG-WHITWORTH MOTOR TANKER FOR SPAIN

Regarding the new Sulzer Diesel-engined tanker "Conde de Churraca," recently built by Armstrong, Whitworth & Co. for Spanish owners, some reports have given the owners of this vessel as the Cia General de Tabacos de Filipines, while others state she is owned by the Sociedad Commercial de Orientede Sebastien. We believe the first mentioned firm is correct.

LLOYDS REGISTER SHOWS 1,447 MOTORSHIPS AGGREGATING 1,263,000 TONS GROSS

According to the latest issue of Lloyds Register of Shipping there has been an enormous growth of motorships since 1913, the total of such vessels in service now reaching one-and-a-quarter million tons gross, or approximately two-million tons deadweight-capacity. The total includes 740 auxiliary sailing-vessels, as follows:

Motorships in Service

1913

290 vessels, 234,000 tons gross

1921

1,447 vessels, 1,263,000 tons gross

If motor-vessels under construction are included the grand total will amount to about 1,550 craft aggregating 2,500,000 tons dead-weight-capacity.

LLOYD'S RETURN OF VESSELS UNDER CONSTRUCTION IN GREAT BRITAIN, JUNE 30, 1921

Gross Tonnage	Steam	Motor	Sail
*100 and under 500 tons......	88	17	17
500 and under 1,000 tons....	92	—	—
1,000 and under 2,000 tons....	77	6	—
2,000 and under 3,000 tons....	55	1	—
3,000 and under 4,000 tons....	62	3	—
4,000 and under 5,000 tons....	42	2	—
5,000 and under 6,000 tons....	80	4	—
6,000 and under 8,000 tons....	108	16	—
8,000 and under 10,000 tons...	48	8	—
10,000 and under 12,000 tons...	6	—	—
12,000 and under 15,000 tons...	27	—	—
15,000 and under 20,000 tons...	24	—	—
20,000 and under 25,000 tons...	5	—	—
25,000 and under 30,000 tons...	1	—	—
30,000 and under 40,000 tons...	—	—	—
40,000 tons and above.........	—	—	—
Total....................	715	57	17

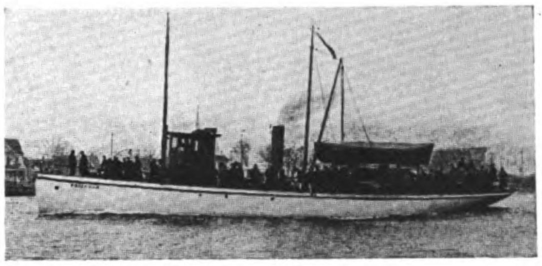
*Vessels of less than 100 tons are not included in Lloyd's Register Shipbuilding Returns. Only ships actually commenced construction included.

AMERICAN CUP CONTENDER NOW PASSENGER MOTORSHIP

The illustration on this page of a yacht-type passenger-boat is the "Priscilla," the old racing yacht of that name built in Delaware in 1885 especially to defend the American Cup. She was actually a contender, but owing to being of heavy iron build was outclassed by the "Puritan" which successfully defended the cup.

Some time ago the hull was purchased by Mr. A. E. England of Albury & Freeman, Miami, Fla., and 100 b.h.p. Fairbanks-Morse surface-ignition heavy-oil engine was installed. Last year she was run during the summer from the Battery, New York to the local fishing banks every day. She is now in operation on a weekly service between Miami, Fla. and Nassau, N. P., Bahama Islands, carrying freight and passengers on this 200 mile run.

The "Priscilla" has now had 18 months' service with her present engineers and has always given good account of herself, says Mr. England. Her length is 100 ft. overall by 23 ft. breadth, and she makes over 9 knots on 8 gallons of fuel-oil per hour. It is interesting to note that Mr. England also states that no vessel of her class can touch her in cost of operation, speed or sea-worthiness.



"Priscilla" a converted American cup defender now a passenger boat propelled by Fairbanks-Morse oil-engines

NORWAY-MEXICAN GULF LINE'S MOTORSHIP "AMERICA"

With regard to the motorship "America" (misspelt "Ameria" in our July issue) recently launched at the Akers Shipyard, Christiania, Norway, to the order of the Norway-Mexican Gulf Line, she has the following dimensions—

Deadweight Capacity ....7,500 tons
Power ....2,100 i.h.p.
Speed (loaded) ....10½ knots
Auxiliary Diesel Engines ....3 of 75 b.h.p.
Length O. A...............................377 ft.
Length B. P. ....362 ft.
Breadth over frames ....51 ft., 3 in.
Depth to Shelter deck ....34 ft.
Depth to Main deck..................25 ft., 6 in.
Cylinder Bore & Stroke....21.260 in. by 28.740 in.
Engine Speed ....150 R.P.M.
Type of Engine ....Burmeister & Wain 4-cycle

On deck there are ten electric winches and an electric-windlass manufactured by the Pusnaes Mechanical Works, Pusnaes, Norway, and a hydraulic steering-gear with telemotor control from the bridge. A refrigerator for the ship's stores is being installed by the Drammen Mechanical Works, Drammen, Norway. The "America" is virtually a sister ship to the "Borgland" already described and illustrated in "Motorship," so further details are superfluous.

ANOTHER AMERICAN STEAMSHIP COMPANY CONVERTED

We have been advised by a promient engineering official of one of the largest American Steamship Companies with headquarters in New York that his company is anxious to go forward with the Diesel-drive and that he will probably leave for Europe very shortly and make complete investigations of the situation over there. Looking up our records we find that the President, General-manager and Superintendent-Engineer of the Line in question are all subscribers to "Motorship."

STRANDING OF THE M. S. "ELMAREN"

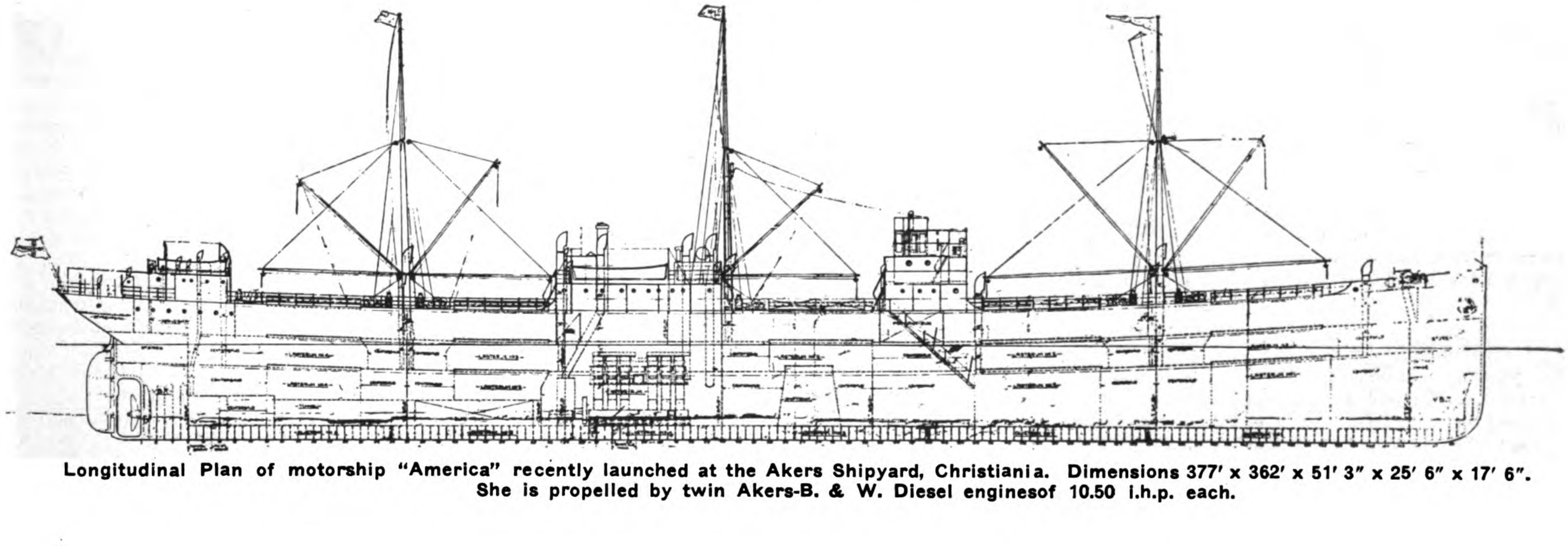
Rumors have emanated, evidently from steam-engineering interests, that the stranding of the motorship "Elmaren" on the "Chagos" Island in the Indian Sea, was due to her Diesel machinery. The builders advise us that this was not at all the case, because the ship ran ashore on account of fogs and current conditions. The chief engineer reported that the machinery worked excellently during the stranding. In fact, in a letter dated March 8th written prior to the stranding of the "Elmaren" Hugo Moren, an engineer aboard, wrote us as follows:

> "We have never been there before, so we could not be trusted to find the way with a sufficient amount of accuracy, but the navigation officers tell us that judging from the tail log, the gyroscope compass and other really nice instruments, we will soon be in Torres Strait, though we cannot see it yet, and there we will be in a constant danger of hitting some huge coral reef or another such thing, thus disturbing the small coral-creatures in their nice building work. So we seem to be a good way from Gothenburg, anyhow."

This seems a very extraordinary coincidence, as a day or two later the vessel ran ashore in a fog.

FROM CRUISER TO MOTORSHIP

Further details of the conversion of the old German cruiser "Gefion" into the motorship "Adolph Sommerfeld" are to hand, showing that the job was by no means a very desirable one. The "Gefion," which was put into service in 1893, was about 360 ft. overall, 43 ft. beam and about 19 ft. mean draught. She was wood-sheathed, and in order to get the new engine-beds fastened down through the double-bottom there was quite a lot of stripping to be done. The double-bottom tanks were not oil-tight, nor could they very well be made so. It was necessary therefore to install fuel-tanks in the engine-room itself. In order to comply with the classification rules of the Germanischer Lloyd, a great deal of new framing had to be built into the ship to strengthen her, and the decks had to be rebuilt with new beams. A new after-part had to be built on, because during the war the original stern had been wrecked for the salvage of the bronze and been patched with light steel plates. At the time of the armistice the ship was being converted into a home for submarine crews, and had been partly gutted for the purpose. This was both a help and a hindrance during her conversion into a Diesel-freighter. Finally they succeeded in getting a cargo deadweight capacity of 3,200 tons on a displacement of 5,250 tons. With two old submarine oil-engines of 1,250 h.p. each slowed down to give 750 h.p. each at 270 r.p.m. a speed of about 10 knots has been attained.



Longitudinal Plan of motorship "America" recently launched at the Akers Shipyard, Christiania. Dimensions 377′ x 362′ x 51′ 3″ x 25′ 6″ x 17′ 6″. She is propelled by twin Akers-B. & W. Diesel enginesof 10.50 i.h.p. each.

BIG CANAL COMPANY

During June the New York Canal & Great Lakes Corporation was registered under the laws of Delaware. The capital is $5,000,000.

TEN THOUSAND HORSE-POWER DIESEL ENGINES

Sulzer-Frères are ready to construct marine-type Diesel oil-engines of 10,000 shaft h.p. for passenger-liners.

THREE MOTORSHIPS FOR WILHELM WILHELMSEN

Three motorships are under construction for Wilhelm Wilhelmsen of Tonsberg, Norway at the Burmeister & Wain Yard, Copenhagen.

MOTORSHIP "ATHENE" CHANGED TO "ESTRELLA"

The recently-built Werkspoor Diesel-engined motorship "Athene" has been purchased by Det Bergenska Dampskibsselskab of Bergen, Norway, and her name changed to "Estrella."

NEW TRANS-OCEAN MOTORSHIP SERVICE

A new service of motorships between Great Britain, Europe and west and South west Africa will shortly be inaugurated by Atlantic Motorships Ltd., Norwich House, Southampton Street, High Holborn, London, W. C. 1.

MOTOR COASTER "MACADAM" LAUNCHED

J. Samuel White & Co., East Cowes, Isle of Wight, England, recently launched the 350 tons d.w. coastwise motorship "Macadam," built for The Road Maintenance Co., Ltd. Propelling power is furnished by a 220 b.h.p. Vickers-Petters surface-ignition oil-engine running at 275 R.P.M.

DANISH PRINCE NOW MOTORSHIP CAPTAIN

Prince Axel, nephew of the King of Denmark, has taken a position as Captain of the East Asiatic Co.'s motorship "Asia." It may be remembered that the King of Denmark recently used the 7,500 tons luxurious passenger-cargo motorship "Fionia" as a yacht on his recent tour.

JOHN BROWN'S YARD LAUNCHES 14,000 TONS MOTORSHIP "LOCH KATRINE"

During the first week in August the 14,000 tons d.w.c. motorship "Loch Katrine" was launched by John Brown & Co., of Clydebank, to the order of the Royal Mail Steam Packet Co., for fruit, passenger and general carrying service from the Pacific Coast to England. She is being fitted with twin Harland & Wolff B. & W. Diesel-engines aggregating 6,600 i.h.p. Speed 12½ knots.

"CUBORE" IN OPERATION AGAIN

Recently the motorship "Cubore" of the Ore Steamship Company sailed from Baltimore for Cuba to load 10,000 tons of iron-ore. She has been laid-up at Sparrows Point for alterations since last December. This vessel is powered with a 3,500 i.h.p. six-cylinder two-cycle Bethlehem-West Diesel engine.

MOTORSHIPS IN THE FAR EAST

Among motor-vessels in service in the Far East is the "Aria," 250 tons d.w., built in Burma in 1918. She is propelled by a 100 b.h.p. Avance surface-ignition oil-engine. The largest motor-vessel constructed last year in the Far East was the "Kungram," 1,400 tons d.w.c., built in Rangoon. She is propelled by a 400 b.h.p. Avance surface-ignition oil-engine.

THE MOTORSHIP "COMETA"

In our last issue we illustrated the launch of the new Johnson Line motorship "Cometa" at the Burmeister & Wain plant in Copenhagen. She is the ninth standard motorship built at this yard for the same owners and a tenth Diesel ship is also on the ways. "Cometa," has the following dimensions:

Deadweight capacity	6,500 tons
Length	367 ft.
Breadth	51 ft., 3 in.
Depth	34 ft.
Power	2,600 i.h.p.

Some motorships for the Johnson Line have also been built at the Götaverken, Göteborg, including the "Buenos Aires" and the "Canada."

SAYS THE BRITISH PETROLEUM CO.

"The present acute condition of industry and transport is incidentally the golden opportunity for the motor-driven ship to prove its superiority.

BURMEISTER & WAIN SOLID-INJECTION ENIGNE

Diesel-engines of the solid-injection type are being built for stationary purposes by Burmeister & Wain of Copenhagen. Their marine engines are of the air-injection type.

OUR REGISTRY OF MOTORSHIP ENGINEERS

J. A. Finn was five years with the U. S. Navy Department operating submarine Diesel-engines, and for six months was trial engineer for the Electric Boat Co. Holds 500 tons motorship license.

George G. Carr, P. O. Box 350, New London, Conn., has unlimited license for motorships, was Chief-Engineer of American motorship. About 10 years' experience in machine-shop; has been foreman of installation work on engines and ships also erecting and testing Diesel engines.

BOLINDERS CO. OPEN NEW ENGLAND BRANCH

Bolinders Company, of New York, announce the opening of a New England branch at 411 Exchange Building, 53 State Street, Boston, Mass., for the purpose of building oil-engines for marine and stationary purposes.

MOTORSHIP FOR QUARTO COMPANY

A 500 tons d.w. motorship is to be built for the Quarto Steamship Co. of Copenhagen, in which Polar Diesel-engines are to be installed. The vessel is to incorporate all the benefits created from the experiences with their motorship "Lidsoe" in which a Tuxham surface-ignition oil-engine is fitted.

OIL-ENGINES IN CANADIAN FISHING-VESSELS

Very few Canadian craft have been heavy-oil engine powered, so it is of interest to record that a 35 b.h.p. Kahlenburg surface-ignition oil-engine is being installed in a new fishing-boat building for the British Columbia Canners Ltd. Another Kahlenburg oil-engine of the same power is also being fitted in a Canadian fishing-boat.

MOTOR TUG CROSSED ATLANTIC

During the war the British Admiralty brought the 118-ft. motor tug "Dreadful" across the Atlantic from Vancouver to England, via the canal, a total distance of 15,000 miles. This vessel is propelled by Bolinder oil-engines, and was originally built for the Canadian Western Lumber Co. of Vancouver. She is now operated by a large towing company on the river Thames.

MOTORSHIPS FOR RED SEA SERVICE.

Two 200 b.h.p. Beardmore surface-ignition oil-engined coastwise motorships of about 550 tons d.w.c. have been built at the London & Montrose Shipbuilding & Repairing Yard, Montrose, Scotland, for Mr. A. Besse of Aden, Arabia. They will be used in Red Sea trading. Their dimensions are as follows:—

Gross tonnage	386 tons
Length	132 feet
Breadth	25 feet
Power	200
Speed	9 knots

The first of these vessels has been named "El Ghazi" and was recently placed in service.

HAMMERHEAD CRANE INSTALLED IN NEW YORK SHIPYARD

A 200-ton hammerhead crane with an 85-ft. radius and a clear lift of 180 ft. has been installed at the New York Shipbuilding Corp.'s yard at Camden by Wellman-Seaver-Morgan Co. of Cleveland.

B. S. N. C. MOTORSHIPS

In a recent issue we gave complete details of the motorship "Domala," owned by the British Steam Navigation Company. Her sister motorships will be named "Durenda" and "Dumana." The former is being built by R. Duncan & Co., Glasgow, while the second is being constructed by Barclay, Curle & Co.

LUBRICATION OF OIL-ENGINES

An article on the lubrication of various kinds of engines and air-compressors appears in a recent issue of the "Compass" published by the Vacuum Oil Company. A section deals with Diesel-engines and another with surface-ignition oil-engines.

ANOTHER BRAZILIAN AUXILIARY

In the 1,598 tons-gross wooden auxiliary-schooner "Italia," built last year for the Lloyd Nacional of Rio de Janeiro, Brazil, by the Empreza de Constr. Nav. of the same city, a four-cylinder two-cycle 13⅜ in. by 21¼ in., 410 b.h.p. Sulzer-Diesel engine has been installed. Her length is 222 ft. by 43 ft. breadth, and 23 ft. 3 in. draught.

CAMMELLAIRD-FULLAGAR LICENSES

The following firms have acquired licenses to construct Cammellaird Fullagar engines:

John Brown & Co. Ltd., Clydebank, Scotland; David Rowan & Co. Ltd., Glasgow, Scotland; Dunsmuir & Jackson Ltd., Glasgow, Scotland; Cammell, Laird & Co. Ltd., Birkenhead, England; Palmers Shipbuilding & Engineering Co. Ltd., Jarrow-on-Tyne, England; Ateliers et Chantiers de Bretagne, Prairie au Du., Nantes, France. As indicated elsewhere it is possible that the Bethlehem Shipbuilding Corp. may have acquired a license.

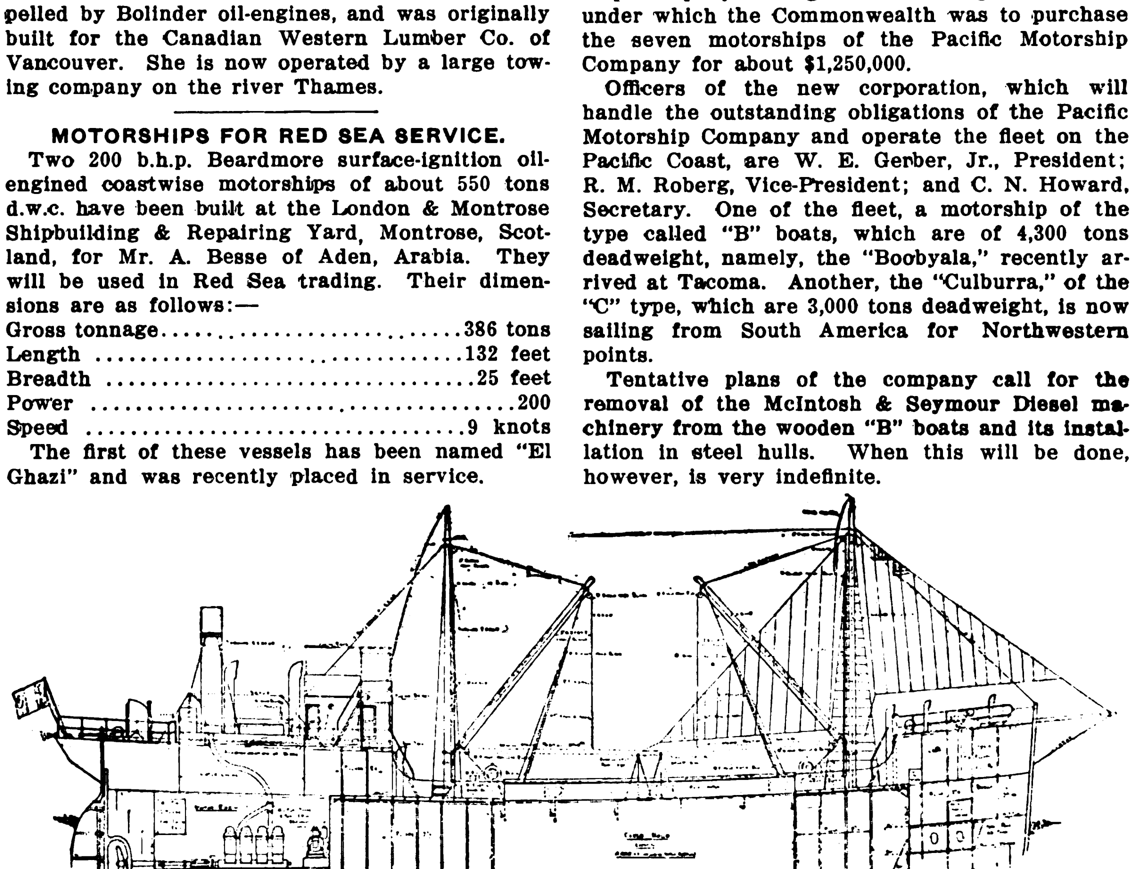
OCEAN MOTORSHIP COMPANY ORGANIZED AT SAN FRANCISCO

May Change from Wooden to Steel Hulls

W. L. Comyn and Co. recently announced that with the organization of the Ocean Motorship Company the affairs of the Pacific Motorship Company were finally adjusted as indicated last month. The new company has bought out all the claims of the Australian Government against the Pacific Motorship Company arising out of the original contract under which the Commonwealth was to purchase the seven motorships of the Pacific Motorship Company for about $1,250,000.

Officers of the new corporation, which will handle the outstanding obligations of the Pacific Motorship Company and operate the fleet on the Pacific Coast, are W. E. Gerber, Jr., President; R. M. Roberg, Vice-President; and C. N. Howard, Secretary. One of the fleet, a motorship of the type called "B" boats, which are of 4,300 tons deadweight, namely, the "Boobyala," recently arrived at Tacoma. Another, the "Culburra," of the "C" type, which are 3,000 tons deadweight, is now sailing from South America for Northwestern points.

Tentative plans of the company call for the removal of the McIntosh & Seymour Diesel machinery from the wooden "B" boats and its installation in steel hulls. When this will be done, however, is very indefinite.



One of two single-screw Beardmore oil-engined coastwise motor-vessels built at Montrose, Scotland, for Red Sea, service.

ARMSTRONG-WHITWORTH MOTOR TANKER FOR SPAIN

Regarding the new Sulzer Diesel-engined tanker "Conde de Churraca," recently built by Armstrong, Whitworth & Co. for Spaniah owners, some reports have given the owners of this vessel as the Cia General de Tabacos de Filipines, while others state she is owned by the Sociedad Commercial de Orientede Sebastien. We believe the first mentioned firm is correct.

LLOYDS REGISTER SHOWS 1,447 MOTORSHIPS AGGREGATING 1,263,000 TONS GROSS

According to the latest issue of Lloyds Register of Shipping there has been an enormous growth of motorships since 1913, the total of such vessels in service now reaching one-and-a-quarter million tons gross, or approximately two-million tons deadweight-capacity. The total includes 740 auxiliary sailing-vessels, as follows:

Motorships in Service

1913

290 vessels, 234,000 tons gross

1921

1,447 vessels, 1,263,000 tons gross

If motor-vessels under construction are included the grand total will amount to about 1,550 craft aggregating 2,500,000 tons dead-weight-capacity.

LLOYD'S RETURN OF VESSELS UNDER CONSTRUCTION IN GREAT BRITAIN, JUNE 30, 1921

Gross Tonnage	Steam	Motor	Sail
*100 and under 500 tons......	88	17	17
500 and under 1,000 tons....	92	—	—
1,000 and under 2,000 tons....	77	6	—
2,000 and under 3,000 tons....	55	1	—
3,000 and under 4,000 tons....	62	3	—
4,000 and under 5,000 tons....	42	2	—
5,000 and under 6,000 tons....	80	4	—
6,000 and under 8,000 tons....	108	16	—
8,000 and under 10,000 tons...	48	8	—
10,000 and under 12,000 tons...	6	—	—
12,000 and under 15,000 tons...	27	—	—
15,000 and under 20,000 tons...	24	—	—
20,000 and under 25,000 tons...	5	—	—
25,000 and under 30,000 tons...	1	—	—
30,000 and under 40,000 tons...	—	—	—
40,000 tons and above.........	—	—	—
Total....................	715	57	17

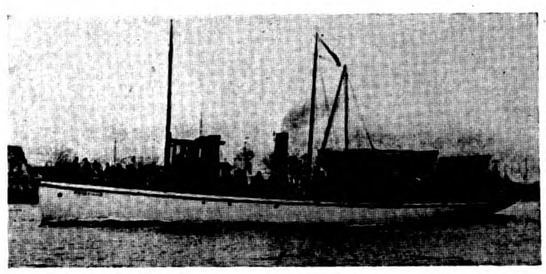
*Vessels of less than 100 tons are not included in Lloyd's Register Shipbuilding Returns. Only ships actually commenced construction included.

AMERICAN CUP CONTENDER NOW PASSENGER MOTORSHIP

The illustration on this page of a yacht-type passenger-boat is the "Priscilla," the old racing yacht of that name built in Delaware in 1885 especially to defend the American Cup. She was actually a contender, but owing to being of heavy iron build was outclassed by the "Puritan" which successfully defended the cup.

Some time ago the hull was purchased by Mr. A. E. England of Albury & Freeman, Miami, Fla., and 100 b.h.p. Fairbanks-Morse surface-ignition heavy-oil engine was installed. Last year she was run during the summer from the Battery, New York to the local fishing banks every day. She is now in operation on a weekly service between Miami, Fla. and Nassau, N. P., Bahama Islands, carrying freight and passengers on this 200 mile run.

The "Priscilla" has now had 18 months' service with her present engineers and has always given good account of herself, says Mr. England. Her length is 100 ft. overall by 23 ft. breadth, and she makes over 9 knots on 8 gallons of fuel-oil per hour. It is interesting to note that Mr. England also states that no vessel of her class can touch her in cost of operation, speed or sea-worthiness.



"Priscilla" a converted American cup defender now a passenger boat propelled by Fairbanks-Morse oil-engines

NORWAY-MEXICAN GULF LINE'S MOTORSHIP "AMERICA"

With regard to the motorship "America" (misspelt "Ameria" in our July issue) recently launched at the Akers Shipyard, Christiania, Norway, to the order of the Norway-Mexican Gulf Line, she has the following dimensions—

Deadweight Capacity	7,500 tons
Power	2,100 i.h.p.
Speed (loaded)	10½ knots
Auxiliary Diesel Engines	3 of 75 b.h.p.
Length O. A.	377 ft.
Length B. P.	362 ft.
Breadth over frames	51 ft., 3 in.
Depth to Shelter deck	34 ft.
Depth to Main deck	25 ft., 6 in.
Cylinder Bore & Stroke	21.260 in. by 28.740 in.
Engine Speed	150 R.P.M.
Type of Engine	Burmeister & Wain 4-cycle

On deck there are ten electric winches and an electric-windlass manufactured by the Pusnaes Mechanical Works, Pusnaes, Norway, and a hydraulic steering-gear with telemotor control from the bridge. A refrigerator for the ship's stores is being installed by the Drammen Mechanical Works, Drammen, Norway. The "America" is virtually a sister ship to the "Borgland" already described and illustrated in "Motorship," so further details are superfluous.

ANOTHER AMERICAN STEAMSHIP COMPANY CONVERTED

We have been advised by a promient engineering official of one of the largest American Steamship Companies with headquarters in New York that his company is anxious to go forward with the Diesel-drive and that he will probably leave for Europe very shortly and make complete investigations of the situation over there. Looking up our records we find that the President, General-manager and Superintendent-Engineer of the Line in question are all subscribers to "Motorship."

STRANDING OF THE M. S. "ELMAREN"

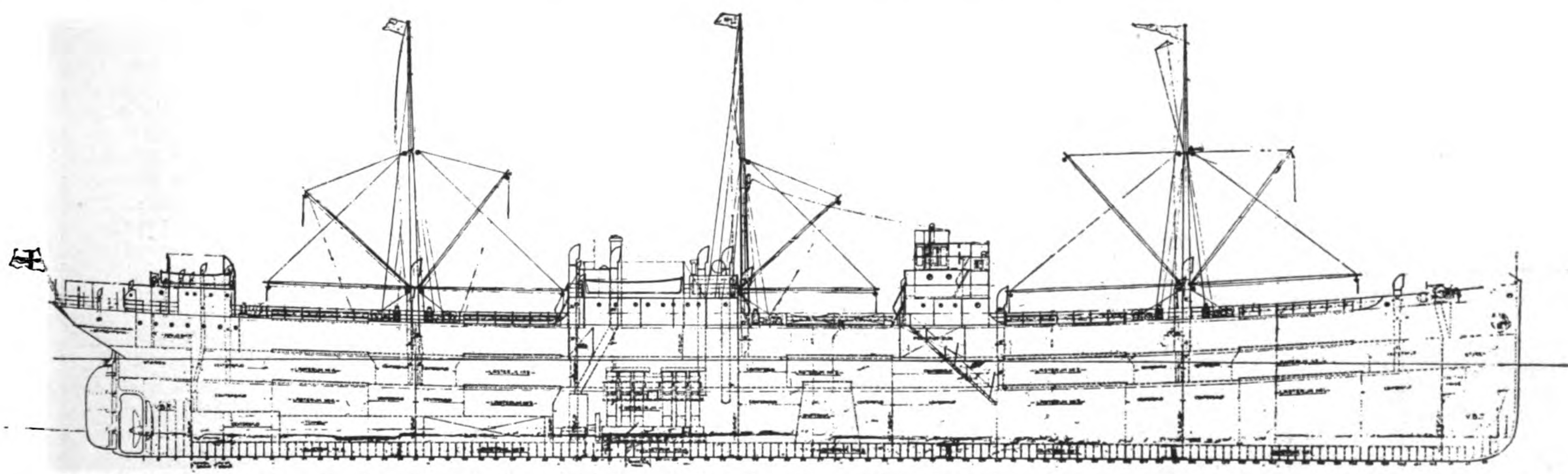
Rumors have emanated, evidently from steam-engineering interests, that the stranding of the motorship "Elmaren" on the "Chagos" Island in the Indian Sea, was due to her Diesel machinery. The builders advise us that this was not at all the case, because the ship ran ashore on account of fogs and current conditions. The chief engineer reported that the machinery worked excellently during the stranding. In fact, in a letter dated March 8th written prior to the stranding of the "Elmaren" Hugo Moren, an engineer aboard, wrote us as follows:

> "We have never been there before, so we could not be trusted to find the way with a sufficient amount of accuracy, but the navigation officers tell us that judging from the tail log, the gyroscope compass and other really nice instruments, we will soon be in Torres Strait, though we cannot see it yet, and there we will be in a constant danger of hitting some huge coral reef or another such thing, thus disturbing the small coral-creatures in their nice building work. So we seem to be a good way from Gothenburg, anyhow."

This seems a very extraordinary coincidence, as a day or two later the vessel ran ashore in a fog.

FROM CRUISER TO MOTORSHIP

Further details of the conversion of the old German cruiser "Gefion" into the motorship "Adolph Sommerfeld" are to hand, showing that the job was by no means a very desirable one. The "Gefion," which was put into service in 1893, was about 360 ft. overall, 43 ft. beam and about 19 ft. mean draught. She was wood-sheathed, and in order to get the new engine-beds fastened down through the double-bottom there was quite a lot of stripping to be done. The double-bottom tanks were not oil-tight, nor could they very well be made so. It was necessary therefore to install fuel-tanks in the engine-room itself. In order to comply with the classification rules of the Germanischer Lloyd, a great deal of new framing had to be built into the ship to strengthen her, and the decks had to be rebuilt with new beams. A new after-part had to be built on, because during the war the original stern had been wrecked for the salvage of the bronze and been patched with light steel plates. At the time of the armistice the ship was being converted into a home for submarine crews, and had been partly gutted for the purpose. This was both a help and a hindrance during her conversion into a Diesel-freighter. Finally they succeeded in getting a cargo deadweight capacity of 3,200 tons on a displacement of 5,250 tons. With two old submarine oil-engines of 1,250 h.p. each slowed down to give 750 h.p. each at 270 r.p.m. a speed of about 10 knots has been attained.



Longitudinal Plan of motorship "America" recently launched at the Akers Shipyard, Christiania. Dimensions 377′ x 362′ x 51′ 3″ x 25′ 6″ x 17′ 6″. She is propelled by twin Akers-B. & W. Diesel enginesof 10.50 i.h.p. each.

Our Readers' Opinions

(The publication of letters does not necessarily imply Editorial endorsement of opinions expressed)

PLOUGHING WITH A CROOKED STICK SAYS A SHIP'S ENGINEER

To the Editor of "Motorship":

There is a question in my mind as to why America is so backward in motorship construction. Is there any precedent for such action, and if it had been as slow in its industrial policy on land where would it be today? If such a policy is allowed to continue, where is our shipping industry going to land? These questions are of vital importance, our prosperity and future defence of the nation depends on them.

Take our cotton mills, for example. I have seen 500 looms in one mill only three years old scrapped, and looms of later date put in because of cheaper production. If it had not been done the mill could not have withstood competition.

Look at the steel industry. How many millions of dollars worth of machinery has been scrapped to make room for modern machines that could cheapen the products so that competition could be met? Now what the writter cannot understand is that if such a policy has been successful on land and has allowed us to manufacture our goods cheaper and better, while paying higher wages and better labor conditions than other nations, why it is not followed out in our marine industry.

We now have marine Diesel-engines that can be absolutely guaranteed, and manufacturers can give examples of their products that have been running successfully for from five to eight years, that surely ought to be long enough to give assurance of reliable service and then look at the standing of the manufacturers behind them. Do you think that any of the firms like McIntosh & Seymour, Worthington Pump Co., Winton Engine Works, Nordberg Mfg. Co., and other firms of like standing would spend thousands of dollars on experimental work conducted by the best brains the country has, or what is more, risk their reputation (which is not to be counted in dollars and cents) producing an article that is not reliable?

There are two things that have to be done so that we can compete with foreign cheap labor, namely, build our ships so that they can be loaded and discharged with the minimum of expense and time and put the cheapest means of propulsion in them. If that is done money enough can be made so as to pay enough wages to attract the class of men that made a success of our land industries.

Fuel for a vessel is 45% of its expense, wages 12%. If two-thirds of the fuel-bill can be saved greater cruising radius can be had independent from foreign fueling-stations assured along with good management. What more is necessary to assure success?

We have plenty of precedent to go by. We once had the greatest fleet of merchant-ships in the world. We also had men who owned them who were, to be polite we will call them ultra-conservative, and did not believe in modern means of propulsion.

We now have another fleet; what is going to happen to that? Are we still going to be ultra-conservative? In Egypt they still plough with a crooked stick and we laugh at them when we think of our modern methods of tractor and plough. If our marine interests would realize what they are now using to plough the seas, I don't think they would laugh, especially while some of our foreign competitors are chartering some of their motorships to our shipowners at a profit carrying American freight. Meanwhile our own ships are rusting at the laying-up stations.

Yours very truly,
G. H. PENDLETON,
Member M. E. B. A., No. 14.
New York and New Orleans

SUPERHEATED STEAM FOR TURBINES

To the Editor of "Motorship":

I have just noted a paragraph in the editorial columns of "Motorship" in the July, 1921, issue, headed "Turbines and Superheated Steam." This paragraph is likely to lead to incorrect conclusions which I think should be corrected. In stating objections to the use of superheated steam on marine turbines, you cite the S.S. "Eclipse." The equipment on the S.S. "Eclipse" and also a number of other similar ships, consists in a turbo generator which operates continuously in one direction all the time, regardless of which direction the ship is proceeding. The propeller is driven by a motor, and reversal is accomplished by reversing the connections to the motor through switches. This turbine, of course, has no reversing stages, and the design lends itself admirably to the use of highly superheated steam.

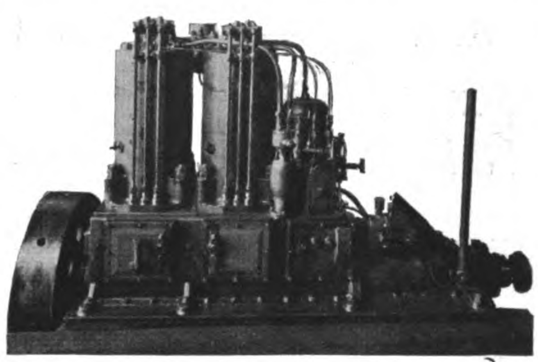
We thought you would undoubtedly wish to have this inadvertent reference brought to your attention.

L. F. DEMING, District Engineer.
General Electric Company, By W. E. Hannum.
Philadelphia Office.

SMALL DIESEL ENGINES

To the Editor of "Motorship":

I received my "Motorship," June issue, and I find my Diesel engines illustrated on page 489. I have just finished a new motor, a little larger



Another marine oil-engine built by Tamada T.

size and of heavier duty than before, having 200 x250 m.m. bore and stroke, with two cylinders, as per enclosed photograph. It was tested on land at 350 r.p.m., but has no indicator-hole, so I cannot take diagrams. I am building a 60x12 ft. boat for this motor. In the near future I will send you a picture of this boat.

TAMADA T.
730 Ikehukuro,
Tokyo, Japan.

THE ENGINEER QUESTION

To the Editor of "Motorship,"

Whereas, the Members of Marine Engineers' Beneficial Association No. 49 of San Francisco, California, having noticed many times, that "Motorship" seems to favor the policy of preferring, or advocating, that Steamship Companies when entering Motor-Vessel operation, shall select for the Engineering Officers from their staff of Steam-Men, having them attend assembling of engines in shop and block tests, and in your June issue descriptions of motorship "William Penn" state this follows the policy put forward many times by "Motorship," which is the practice adopted with success by European owners; adopted a resolution that write you a letter mildly protesting against this policy while there are many trained Diesel men in the field for employment who have successfully operated Diesel Propelled vessels on various trade routes.

Furthermore, we fail to understand why an Engineer having only steam experience at sea is better qualified with a few weeks shop experience to operate Diesel-engines than a man who had fought the game at sea from the time of the first commercial internal-combustion engines to their present stage of development and have handled electrical equipment in motors and generators far in excess of usual steamship equipment.

Therefore, we request for the betterment of the profession that mistakes or defects as now exist among Diesel-men which makes "Motorship" and successful European Operators prefer the breaking-in of steam engineers to the employment of men with actual and successful experience in the operation or surface-ignition and Diesel-engines on smaller ships. It seems to us that with such a policy for successful operation there is small incentive for a man to work for proficiency in internal-combustion engineering and also electrical, whereas he may become proficient in steam engineering and obtain a standing equal to any aboard ship.

Lastly as we are in perfect amity with Marine Engineers' Beneficial Association No. 35, the steam local in San Francisco we are attaching their signature to the above.

Yours very truly,
GEO. HUMPHOFF,
BUS. MANAGER, M.E.B.A. No. 49
ERNEST F. POGG,
BUS. MANAGER, M.E.B.A. No. 35
San Francisco, Cal.

[Apparently you are under a mis-conception regarding the attitude of this publication towards oil-engineers, probably due to more motorships having been constructed on the Pacific Coast than on the east Coast, with the result that more experienced men are available. Shipowners on the Atlantic coast are continually bringing forth the argument that only a few experienced Diesel-engineers are available to operate motorships if they place orders. Consequently, they seem to be in fear of a shortage of capable engineers and that their ships will be held up accordingly.

We have frequently pointed out to shipowners that plenty of skilled Diesel-engine operators could be obtained in a short period to fill the shortage by sending experienced steam-engine operators to the Diesel-engine builders plant for several months. There is no attempt on our part to suggest that such men should be used in preference to engineers already skilled and experienced in the operation of marine oil-engines.—*Editor.*]

BACK COPIES OF "MOTORSHIP" AVAILABLE

To the Editor of "Motorship":

We noticed your frequent calls for back numbers of "Motorship," and as a result of a search in our files we have found the following extra numbers we would like to dispose of at a reasonable price:

March, 1918; May, 1919; June, 1919; July, 1919; November, 1919; December, 1919; May, 1920; June, 1920; September, 1920; February, 1921.

DANCKWORTT & NICOLAYSEN,
511 Crary Building By Thom. B. Danckwortt.
Seattle, Wash.

RE-CONDITIONING THE M/S "STASIA"

To the Editor of "Motorship,"

We have read in your esteemed publication of March, 1921, an article signed by Mr. Leashot, "Overhauling the M/S 'Stasia' in China." Please let us complete this article so as to give to each one his share of credit in this job.

The overhauling of the "Stasia" hull and motors was undertaken by "Les Etablissements Brossard Mopin de Tientsin" and executed at their Hsin-Ho Shipyard. The ship was burnt more than one hundred feet from the poop to the middle. Only the hull till three feet above the water line was still in good condition.

In June, 1919, the ship, by the care of the underwriter, was towed to Hsinho. The overhauling started immediately under the direction of the management, Mr. Leschot being only one employee working under the supervision of the chief of the engineering department. We experienced some delay, owing to the difficulty to secure the spare parts from Sweden; the cylinders fitted up were case and machined in the Tientsin works of the Etablissements Brossard Mopin. These repairs were made not only by Mr. Leschot, but by all the people working in the respective departments.

The engineers who took charge of the motors after the completion of the repairs were ex-engineers of the French navy having a great deal of experience in oil-motors, and the "Stasia" went to Shanghai only for small repairs having nothing to do with the running of the motors.

We will be very pleased if you will insert the above rectification.

ETABLISSEMENTS BROSSARD MOPIN.
Tientsin, China.